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The Farmer's Digest

Volume 15 February, 1952 Number 8

A Good Farm Doubles Its Production

Condensed from Successful Farming

Bill Ward

COULD your farm be producing more—much more? Ralph Space's farm is a good one for you to take a look at today.

Space farms 154 acres in Tompkins County, New York. It is considered pretty good land in that section of the country. It was pretty good back in 1937, but Space had an idea it was better than his production indicated. Today, a quick look at his farm books will show you how right Ralph was.

By comparing the figures for 1950 with those for 1937, you can see that the total production from this farm—with no change in total acreage—has more than doubled in the past 14 years. The farm is carrying more than twice as many cows, producing almost 4 times as much milk, and total crop yields have more than supplied the additional pasture, hay, and silage needed for the additional cows. In fact, Space had a surplus of 25 tons of hay on his farm last year.

How do you go about getting more production out of the same number of acres? In some cases, of course, you can't. But on many farms you can do the thing Ralph Space did and come out money ahead.

To begin with, Space's first move was to make his best land better. He used plenty of commercial fertilizer as well as the manure from his dairy herd. But he needed more productive land, so he improved 19 acres that had been idle for many years. He pulled out small trees, cleaned up brush, and killed weeds. The first crop on this land was soybeans for grain. Then he worked the land into a regular rotation.

Space's rotation program has had a lot to do with increasing production. But along with the rotation goes plenty of fertilizer. Lime—2 tons per acre per rotation—superphosphate, 10-10-10,

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and 6-12-6 are applied as needed.

Space has his best land on a 4-year rotation of corn, oats, 2 years of hay. The other land is in a longer rotation—oats, and/or corn, hay for 3 or 4 years.

In the early days of the land-improvement program, Space made low-cost improvements such as fencing off pastures to rotate them. He plowed up permanent pasture as he could afford it. He plans to have no permanent pasture in the future.

At first, timothy was used exclusively, but now brome, alfalfa, red clover, and Ladino are used. These pastures will now carry three times as many cows.

This energetic farmer says he

Size of business	1937	1950
Number of cows	11	28
Number of heifers and calves	16	33
Number of hens and pullets	770	1,000
Size of farm—acres	154	154
Crop Acres	61	80
Man equivalent	1.3	2.3
Total work units	516	834
Rates of production		
Total milk production (lbs.)	96,728	353,901
Eggs sold (doz.)	10,260	16,740
Milk sold per cow (lbs.)	8,794	12,639
No. of eggs per hen	160	200
Crop yields		
Hay production (tons)	52	110
Hay per acre	2.0	2.4
Corn for silage (tons)	90	165
Silage per acre (tons)	10	11
Oats (bu.)	375	1,500
Oats per acre (bu.)	30	75
Labor efficiency		
Cows per man	8.5	12.2
Work units per man	397	363
Hundredweight of milk sold per man	744	1,539
Balance of business		
Number of cash crops aside from milk	1	1
Land class	V	V

used to think he couldn't turn the cows out to pasture until May 25. Now he generally turns them out by May 10 or earlier. He also pastures them three weeks later in the fall than he used to on the old pasture. The cows get a lot more feed too., They used to get silage from July 1 on. Now they get silage for two or three weeks in July and no more until October.

Next came soil-saving practices. A steeply sloping pasture was strip-cropped to hold the runoff water. A pond was built in another pasture to hold water and provide the cows with a built-in tank.

Space thinks his breeding program has been one of his biggest helps in increasing milk production. But better pastures get credit, too. He started out with a grade herd of Holsteins but has worked into purebreds. Better breeding gets credit for the largest milk-per-cow increase—8,794 to 12,639 pounds. Space uses both artificial breeding and his own bulls. He buys bulls, proves them, and sometimes sells.

The chart below gives the best proof of Ralph Space's work. Look at the jump in production since 1937. Crop yields have increased all along the line. Milk production jumped also. How about your record book? Does it tell the same story? If not, it's time you asked yourself why.

How to Kill Garlic

You can do something to get rid of wild onion and garlic in your pastures.

For best control one to two pounds of active 2,4-D per acre should be applied before the garlic reaches a height of six to eight inches. Later applications (up to May 1) are less effective with respect to complete control but are recommended as an emergency measure. It should be kept in mind that ladino clover and other pasture legumes are easily damaged by 2,4-D.

It should be emphasized that one or more 2,4-D treatments in a single season will not give a complete kill. Certain of the bulbs from which new plants grow may remain dormant in the soil for as long as two years. Also, all bulbs do not germinate at the same time so that some late germinating ones may be missed by a single early spring treatment.

To be most effective a control program should be followed by mowing to prevent bulb, bulblet and seed production. A schedule such as this for two or more consecutive seasons will nearly eliminate the wild garlic and onion from pasture lands.

Richard J. Aldrich and Milton A. Sprague
—N. J. Farm & Garden

Let the $ Sign Be Your Guide

Condensed from the Ayrshire Digest

Henry B. Mosle

THE FIRST problem besetting a dairyman, whether he be a purebred breeder or not, is the problem of survival. For the dairyman, like every other farmer, is first and always a small businessman and as such suffers from all the handicaps to which small business is exposed—limited funds for research, an inability to afford adequate advertising, neither time nor cash for a promotional campaign, the disadvantages of being a small scale buyer, and so on.

But before going into these matters, it is worthwhile to pause and ask the $64 question: What are the things that contribute to successful dairy farming? First and foremost, of course, is a productive herd of milking cows. Such a herd makes adequate use of home grown forage, attains and transmits the capacity to make a lot of milk economically, is healthy, and, perhaps most important of all, can live profitably and productively as good producers and reproducers to a ripe old age. All the paraphernalia of measurement that we have, herd test records, lifetime production records, approved sire and dam studies, selective registration, type classification and the like—all of these are nothing but attempts to classify or commit to paper and embody in a program those things which experience has taught us are likely to contribute to the desired result —a practical, lasting, profitable cow.

A good herd of cattle is not enough. There are at least three other things of great importance to a successful dairy farming venture. These are adequate land in a high state of productivity, efficient management, and a market for the goods produced.

If you want a good fire, you use the best fuel obtainable and set the drafts and other controls in a manner best calculated to produce the kind of fire that is wanted. A cow is just as much an internal combustion engine as is a tractor. She is a complicated furnace for consuming and distilling the nutritive factors in forage and grain and converting these to flesh and milk. A cow is a far more wonderful machine than you can buy, for she will adapt herself to converting a surprisingly wide range of fuels to the purposes for which she is kept. Nevertheless, you cannot expect

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Brandon, Vermont, August, 1951

top performance from inferior feed even from a cow. The essential problem for the practical dairyman is to supply fuel to the cow in the most economical manner. Know your farm and let the dollar sign be your guide. Pasture pays best because you don't have to harvest it. Forage comes next because in its natural state man cannot use it for food, and so is not in competition for its use. Some grain is essential, especially for high production, because as a concentrate the cow's stomach, which is of a given size, can take in just that much more food stuff. The proportions will be determined by farm size and layout, climatic conditions, availability of help, extent of mechanization, and so on. The point is that the cost of these can be figured out in terms of time and money, and the record will show what the returns per dollar of investment in the various categories are. A good farm plan without good cows to utilize farm production is foolish. It is just as foolish to buy and keep good cattle and not feed and manage them properly. A farm is like a tennis court. You can own a good tennis court, but that doesn't make you a tennis champion; yet a tennis champion can play a very good game on a poor court. When a good farmer teams up with a good farm and a good herd of cattle, you are going to hear more about the combination by and by.

Now about the market—one thing is certain and that is that if there are no people around to drink milk, the best cows and best farm won't pay out producing grade A milk for local consumption. This is, of course, not the only alternative: there are always other markets for butter, cheese, skim milk and the like. Still it is worthwhile finding out what your market is and what it is likely to be over the next 30 or 40 years because (1) dairying is essentially a long term operation and requires considerable capital investment and because (2) the type of feeding program that will pay will vary in accordance with the probable price for the product. In proximity to large cities, land is dear and the wages you have to pay help are high, to say nothing of taxes. On the other hand, in sparsely settled areas it may be hard to find a good market for all of your production at a good level of return. These are individual problems, and as in the feeding of your herd the essential is to let the dollar sign be your guide.

So far nothing has been said about the advantages or otherwise of being a purebred breeder. This is because, so far as this writer is concerned, being a purebred breeder must always come second to being a good farmer. The purebred business entails extra costs:

the cost of registrations, of herd testing and classification, of advertising and promotion. None of these costs except, perhaps, the first one is worthwhile unless as a breeder you have something to sell. You will not have something to sell unless you have a productive herd, efficiently managed, on a good farm. Nor can you expect to meet the deficits of an uneconomical farming operation from the profits of the purebred business. At best, with only very rare exceptions, the main income of any purebred establishment must in the long run come from normal farming operations—the sale of milk, and of calves and cull cows to the butcher, of produce if it is surplus, and so on. The income from the purebred business is an extra; but—and this is the whole point—that extra is what makes the difference in terms of standards of living for the whole family between just being a good farmer and being something quite a lot better—a man bettering himself by doing a job for the general welfare of other breeders and to the ultimate good of man-kind.

If a farm with 40 milking cows can average 10,000 lbs. of 4% milk and sell it at $5.00 a cwt., then the farm's gross will, roughly speaking, be $20,000 a year. If this man is nothing but a good farmer, this is just about all there is to it: he is going to live on the difference between this gross and his total operating costs. But if this man is a purebred breeder and has cows that will average to live to be 12 years old, if some of these are Approved Dams and he is using an Approved bull, then this man can expect to increase his gross income, first, by the annual sale of from 12 to 16 females for breeding purposes at, say, $100 above the price of similar grade stock and, second, by the sale of at least 10 good young bulls for, say $150 each. Occasionally he will have a sale topper among these. Every now and then he can sell an Approved sire for good money. Or he can lease his good sire to an Artificial breeding unit. What does all this mean? At its lowest figure it means an additional annual gross income of at least $3000. But remember, and this is the point, if he doesn't have the cattle and the farm, if he doesn't have the production and the old cows, then being in the purebred business is an added farming expense and not an additional source of income. Be a good farmer, breed good cows and advertise them intelligently, and the purebred business will pay dividends in better living for the whole farm family.

The Sow Is Half Outdated

Condensed from The Farmer

Berry H. Akers

THE DAY is here when hog raisers can take the pigs away from their mother soon after they are born, ship the sow to market immediately or breed her again within a few days and get three litters a year from her instead of two.

Sounds revolutionary, doesn't it? It is, but no more so than was the invention of the farm incubator that replaced the sitting hen and the big incubators that made possible the chick hatchery industry.

This method of hog management has been made possible by the formulation of a synthetic milk, fortified with antibiotics, to replace sow's milk. The synthetic milk provides the feed the young pigs normally draw from their mother and the antibiotics reduce the incidence of infant diseases and increase the rate of growth, making it possible to bring the pigs to market weight at an earlier age than normal sow-fed pigs. Researchers say pigs fed the synthetic product will at eight weeks of age weigh from 10 to 35% more than those which stay with the sows until they reach that age.

Under this method of management, baby pigs can be taken from the sow within 48 hours after they are born instead of the usual 56 days. Litter sizes, limited under the sow-fed method by the sow's milk production, can be expanded to the sow's capacity to produce. There will be feed for "extra" pigs, those which the sow can't nurse and which often must be killed. The problem of the orphan pig is solved and runts can be saved. The danger of losses by the sow lying on her offspring is eliminated.

Relieved of her duty as a mother, the sow can be sent to market as soon as she has been fattened. Or she can be rebred within a few days, making possible up to three litters a year. Some sows have been rebred as early as three days after farrowing. Not all sows will breed, nor will conceive, at the three-day period, but sow acceptance of the boar at 17 days is just about normal and virtually all will rebreed within 31 days after they have farrowed.

Special farm management techniques are necessary in handling pigs by this method. Careful sani-

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St. Paul, Minn., December 1, 1951

tation is highly important. The pigs must be kept warm with the temperature constant; the sow's milk replacer must be fed warm and it must be available always so the little pigs can drink as often as they nurse the sow.

The idea of taking pigs from their mothers shortly after birth and feeding them a ready-made synthetic milk is not entirely new. Dr. Connor T. Johnson and coworkers at the University of Illinois worked on this idea several years ago before antibiotics were available, but the synthetic sow's milk they formulated was too costly for practical farm use. The problem of cost now seems to have been solved.

Land O'Lakes Creameries, Inc., is now marketing a pig milk replacer and Chas. Pfizer & Company, the world's largest manufacturer of antibiotics, has announced that it has a similar product. Land O'Lakes wanted to develop a wider market for the by-products of its milk drying plants and Pfizer to enlarge the market for its antibiotic—terramycin. The formula of both is somewhat similar. It is dried milk by-products (principally skimmilk), lard, vitamins, minerals, and an antibiotic. Land O'Lakes fortifies its product with aureomycin; Pfizer with terramycin.

Land O'Lakes carried on its research work at its Anoka Research Farm. The pigs were kept in farrowing pens, warmed with heat lamps, and fed the synthetic milk in heat-controlled poultry fountains. Pfizer did its research in its laboratories in Brooklyn, and on farms in Iowa and Pennsylvania.

The pigs in the Pfizer Laboratory are kept in poultry batteries and fed from troughs. Each battery holds 10 pigs. The floors are wire screen, of mesh small enough for the pigs to stand on, large enough for droppings to pass through into pans below. Flushing of the pans and change of litter take care of the major sanitation problem. Humidity is controlled. Warmth is provided with heat lamps, but on the farms the "nurseries" are steamheated.

Pfizer researchers ran into two interesting difficulties. The little pigs in the batteries crowded each other at the feed troughs just as they do when they are nursing their mothers, so partitions were put in. They also discovered that the little fellows had a tendency to sleep for hours in such comfortable quarters, with no mother to grunt and tell them it was time to nurse. So they made a recording of a sow's grunting and other hog-house noises and each hour this recording is played automatically to wake the pigs. Immediately they rush to the feed troughs.

Another device they developed is a "learners trough." Though most pigs will learn to drink

normally at 48 hours of age, simply by having their snouts ducked in milk, slow learners are taught by fixing a row of nursing bottles in the feed trough, so that the nipple extends just above the surface of the liquid. In a few days they drink as well as the quick learners.

The economies of this new method of handling little pigs are far-reaching. Researchers say it reduces the cost of production. It enables a farmer who doesn't wish to rebreed a sow to sell her immediately and save the extra cost of putting on fat which fat the market doesn't want. It makes it possible to rear larger litters. There is less infant mortality. It may make possible even more rapid development of pig hatcheries. A prediction that a sow may eventually do no more than farrow the pigs may be in the cards; and the hog raiser will turn to the pig hatchery for his pigs just as the farm woman turned to the hatchery for her baby chicks.

"Climate Calendar" Gives Crops on Time

Condensed from New Jersey Farm and Garden

Louis LeCalvez

SUPPOSE you want to slip a sweet corn harvest in between snap beans and limas without an overlap, so that you won't be caught short-handed on labor or trucks or other equipment? Or suppose you want to time a crop for the high dollar early market? The average farmer has to estimate it as close as he can, and let it go at that.

But at Seabrook Farms, in New Jersey, where production for quick-freeze packaging runs into hundreds of thousands of acres, even a 48-hour slip-up in calculations can cost lots of money. In order to get this production schedule down to a scientific basis, they use a "climatic slide rule" that solves the problem. It is based on extensive research with special equipment at Seabrook for various crops by Dr. C. W. Thornthwaite. The end result is this gadget that will be available to all farmers—in simpler form—in the near future. Here is how it works:

Let us say we want to harvest a field of Alaska peas on June 5. The seed catalog tells us that it takes 57 days to grow them. But by using our slide rule, we find that the planting date that will give us a harvest June 5 is 96 days earlier, or March 1. If we

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want a harvest on July 7, however, we know we can shorten the planting date.

The reason the slide rule gives the answer is because it is worked out for the "growth index" of various crops like peas, corn, asparagus, or even apples or grass. We know that a certain crop takes so many weeks to mature in relation to length of day and temperature. If we don't fertilize or cultivate one field as well as another, it will still mature at the same date, if planted on the same date. But it won't be of the size or quality or volume of the better-cared-for field.

It is only the amount of sunshine and water that can hasten or slow the growing time. It is for the purpose of relating this moisture and temperature need to a particular variety of crop that the slide rule was invented. What it really does is translate the *civil* calendar into a *climate* calendar.

In order to get the data needed to work out the slide rule, Dr. Thornthwaite, who is director of the John Hopkins Laboratory of Climatology at Seabrook, has reduced the problem to how much a given crop needs in the way of water. The device that measures a crop's water requirements is called an "evapo-transpirometer." Not only does it give Seabrook the data necessary for growing crops successfully in this area, but serves as a daily check on the moisture reserve.

Under Seabrook conditions, crops always have needed supplemental irrigation. The average shortage of rainfall is about four inches a season, but it varies greatly from season to season. In 1930, for instance, rainfall failed by 16 inches to supply the needed water.

Seabrook has six of these "evapo-transpirometers." They are large, sunken tanks filled to ground level with soil. If running a "watchdog" check on peas, for instance, peas are planted not only in the tank soil but around the entire area to make sure it will be a uniform test. Then a permanent water table is maintained in the tank at a given depth. As the roots and leaves draw on the water supply, it is easy to measure how much moisture is being used. If it gets to the danger point, Dr. Thornthwaite issues orders for irrigation to be applied in a given amount.

During the five years these tanks have been in use at Seabrook, spinach, peas, lima beans, sweet corn, and grass have been studied. From the data collected it has been possible to determine water requirements of all crops growing at the farms and to relate them to temperature and day length.

This slide rule system covers some other crop experiments to date, including several varieties

of potatoes and tomatoes, and measuring the growth index from blossom to harvest time for apples —under local conditions.

The question has been raised: What happens to these calculations if you experience an unusually sunless season, and the harvest for a certain date fails to materialize on time? This sometimes happens, but it usually occurs to all crops at once, so that you merely advance the harvesting dates for all crops by the required amount. You still avoid the costly pile-ups.

Dr. Thornthwaite's "climatic calendar" is now in production. It probably will take the form of a four-inch square card, with a dial setting that will show the relation of the civil calendar to the planting calender. Conceivably, some similar means of providing farmers with a guide to irrigation requirements could be provided, in Dr. Thornwaite's opinion.

Feed Your Forage Crops

Condensed from Eastern States Cooperator

Dr. J. A. Chucka

SUPERIOR strains of grasses and legumes are now available to Northeast dairymen for pasture, silage and hay production. Experiment stations and leading farmers have demonstrated that combinations of the best strains of such grasses and legumes as bromegrass, orchard grass, Reed canary grass, alfalfa, ladino clover, and birdsfoot trefoil have the capacity to produce four, five or even as much as six tons per acre of hay or its equivalent in silage or pasture. With adequate fertilization and proper management it is possible to double or triple the present average acre yield and to improve materially the quality of roughage on our northeastern dairy farms.

To achieve these possibilities, however, it is necessary to do more than merely to get the seed of these superior forage crops and make the seeding. These higher yields cannot be expected without an extra investment in higher soil fertility nor the improved quality without better management of hay fields and pastures. Those who make the necessary expenditures will get good returns on their investment and for their effort.

The first step in fertility improvement for both grasses and legumes is an adequate liming

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program. To produce both high yields and high quality roughage, hay and pasture soils should be limed to a pH of between 6.0 and 6.5. This range of soil reaction appears to be most favorable. At lower pH values soils often contain substances in solution which reduce the efficiency of fertilizers and interfere with the functions of the beneficial soil organisms. At pH values much above 6.5, there is the possibility of reduced availability of some of the trace elements, particularly boron and manganese.

How much lime needs to be applied to bring the soil reaction to the desirable range of 6.0 to 6.5 varies with the type of soil and with its present degree of acidity. A soil test should be used to determine the amount needed.

What kind of lime should be used may vary with local conditions, but in most instances a finely ground dolomite limestone is the best material to use. A dolomitic limestone ground to pass a 20-mesh screen and applied in sufficient amounts will not only adjust the soil reaction to the desired level, but will also supply adequate amounts of both calcium and magnesium for nutrient purposes.

The time and method of lime application appear to be more important when one is attempting to make a rather large adjustment in soil reaction than they are when small amounts of lime are being added for maintaining the soil reaction at a given level. Both grasses and legumes develop a much more extensive root system in that portion of the soil which has been limed. Thus, if one is planning on growing these superior forage crops on a soil that calls for two or more tons of limestone per acre, deep and thorough incorporation of the applied lime is very important. Under such conditions, applying half of the lime prior to plowing and the remainder after plowing may well be considered as a means of getting the lime mixed throughout the entire plowed layer. For maximum yields of alfalfa even a subsoil application of lime might well be considered.

On the other hand, after a desirable level of pH has been developed throughout the plowed layer the time and method of applying lime needed for maintenance of that desirable reaction are less important. For maintenance purposes on established sods the lime may be topdressed on the surface any time during the growing season.

In addition to the calcium and magnesium supplied by lime, adequate amounts of the other essential nutrient elements, both major and minor, must be provided. Fertilization of sod crops may be divided into three separate phases. The first is a pre-seed-

ing treatment in which a generous supply of nutrients is incorporated deeply into the soil at the time of seedbed preparation. The second is the starter fertilizer applied at seeding time. The third is the topdressing which must be applied to maintain the stand.

The kind and amount of fertilizer that should be applied during each of these three phases of fertilization may vary with the combination of crops planted, with the yield level desired, with the duration of stand hoped for, and to some extent with the soil type.

Under all conditions a generous supply of phosphoric acid and potash should be applied in the preseeding treatment. If legumes are to predominate in the stand, this treatment should consist of at least 400 to 600 pounds per acre of 0-20-20. If grass is to be favored, the fertilizer should contain some nitrogen as well as phosphoric acid and potash.

The second phase of fertilization is the application of a starter fertilizer at seeding time. This fertilizer should always contain some nitrogen. The proportion of nitrogen to phosphoric acid and potash may vary, depending upon the proportion of grasses and legumes in the seeding. The amount of starter fertilizer should be relatively small, 200 to 300 pounds per acre and it should be placed fairly near to the seed. This starter fertilizer, as the term implies, gets the seeding and companion crop off to a quick start and carries them to the point where their root system reaches the more deeply applied fertilizer or manure. The starter fertilizer should contain some nitrogen, even for legumes, to help them grow until such time as nodules develop and enable them to draw on atmospheric nitrogen.

The third phase of grassland fertilization, namely, annual topdressing, is by far the most important in maintaining stands and yields of the desirable species. Yet, it is this phase that is most neglected by dairymen. Far too many of our dairymen apply a little fertilizer or manure at the time of seeding and nothing more. As a result, they get one or two fair cuttings and then lose their stand.

The kind of fertilizer that should be used as a topdressing depends upon the proportion of grasses and legumes desired in the stand. An 0-15-30 is recommended on nearly pure legume stands, a 10-10-10 on pure grass stands, and 8-16-16 or 5-15-15 on mixed stands. Higher yields of forage can be secured as the proportion of nitrogen in fertilizers used for topdressing increases, but it becomes increasingly more difficult to retain legumes in the stand as more nitrogen is used.

The amount of fertilizer that should be applied varies primarily

with the yield desired and with the soil. Since the purpose of topdressing sod crops is to maintain or if possible increase yields, it appears logical that one must at least replace the nutrients removed by the crops harvested. If we examine the chemical analyses of really good quality hay, we find that it contains at least two per cent nitrogen and at least two per cent potash. That means that with each ton of hay or pasture equivalent harvested, we have removed at least 40 pounds each of nitrogen and potash. A four-ton crop of these superior grasses and legumes harvested at a stage that makes high quality hay removes in the vicinity of 160 pounds each of nitrogen and potash. If we are to maintain such yields, we must replace that nitrogen, minus the amount fixed by legumes, and we must replace that potash, minus the amount released annually by the weathering of soil minerals. The amount of phosphoric acid removed by these crops is only about one-third of the nitrogen and potash. However, because of the low solubility of soil phosphorus, we must apply somewhat more than the amount actually removed by crops Present information indicates that we may have to apply about half as much phosphoric acid as potash when topdressing hay and pasture fields for high production. On this basis, the phosphoric acid and potash removed by a four-ton yield of pure legume hay are equivalent to those in 535 pounds of an 0-15-30. The nutrients removed by a four-ton yield of a 50-50 grass-legume mixture are equivalent to those in 1000 pounds of 8-16-16 and the nutrients in a similar yield of pure grass hay are equivalent to those in 1600 pounds of 10-10-10.

Whirlwind Milking

Condensed from the California Farmer

H. C. CAIN, Manhattan Beach, Los Angeles County, California has invented a system by which two men can milk 100 cows per hour in normal everyday work routine.

The record was proven last year when two girls, who had never used the system before, milked 100 cows in 57 minutes and 15 seconds in an official stopwatch test judged by five competent men and observed by a large crowd of spectators at the Los Angeles County Fair, Pomona.

Reprinted by permission from the California Farmer,
San Francisco, California, November 3, 1951

The average production per cow was increased 18 per cent and held for 17 days, the duration of the fair, and the highest bacterial count during that time was 12,000—usually it was lower. This is very close to the certified milk standard which allows a maximum count of 10,000.

Like many inventions in their completed form, this machine works so smoothly that spectators frequently ask, "Why wasn't this system put to use long ago?"

Only two of the machines exist. The original model, after four years in the making and testing stages, is now installed at the Hiett Crystal Dairy at Delano, Kern County, California, and the other, a demonstration model, is installed at the Los Angeles County fairgrounds. However, a further improved model, with which Cain is positive two men can milk 120 cows per hour, has been designed.

In this new system of milking, the cows ride past the milkers on a 90-foot, wood-slatted conveyor belt, similar in principle to the escalators seen in modern stores. It is driven by a 5 h.p. electric motor. Stall partitions with a feed box attached rotate with the conveyor, separating the line into 10 stalls. They return over the top of the cows in a continuous chain.

A milking machine rides beside each of the 10 stalls on an electric trolley, their rate of travel synchronized with that of the "escalator belt" which carries the cow the length of the parlor in 6 to 8½ minutes. At the end, she steps from the conveyor and walks back to her pen.

Three additional milking machines operate with the system, traveling on the return track or waiting empty and ready for the next cow at the starting point. Each of the 13 machines has its individual rotary vacuum pump, electric motor and pulsator, a glass container to hold the milk, and teat cups.

The cows are washed automatically before they reach the first milker, on the receiving end of the line, who feeds grain, then attaches the teat cups. The second operator removes the teat cups when the cow is finished, and the machine with its load of milk continues on its "streetcar trolley" ride to the farthest end, where the milk is dumped automatically and pumped into the milk room to be cooled and further processed.

Human hands never touch the milk, nor is it ever carried. All the work is automatic, except the feeding, placing and removing the teat cups and cleaning up the machines. The traveling platform is raised so that all stooping and squatting by the operators is eliminated.

The machine will soon be available for general distribution, but the cost or the manner in which

a dairyman may get one has not been definitely determined.

The tentative plans are for no outright sales, but if everything works out as expected machines will be installed in dairy barns on a lease basis, the cost about that of one good hired man.

Make Good Use of Your Feeds

Condensed from the Michigan Farmer

Fred Trump

With meat in such demand, livestock men should make the most of available feed. If feeds are plentiful it is usually more profitable to: (1) Short-feed common cattle; (2) feed good quality cattle to a "good" finish; (3) feed choice cattle to a "choice" finish. National feed stocks are diminishing, so if you find feed scarce—remember that high finish wastes feed. It takes no more grain to feed 2 choice steers to a "good" finish than it does to make "choice" slaughter grade out of one choice steer, according to USDA livestock specialists. When cattle are fed to a high finish, gains are more expensive toward the end of the feeding period. Earlier lean growth, because of its high water content is cheaper to produce than fat. Later on more fat is put on and high quality of the lean improves little.

Older and heavier animals on full feed require more feed per pound of gain. Calves take 4 to 6 weeks longer to fatten than do yearlings, but calves make the more economical gains. It takes about 2 weeks longer to fatten yearlings than it does 2-year-olds, though yearling gains are cheaper than for the latter. Common and medium grade steers will gain as fast as good and choice steers in similar condition. The quality and carcass yield of the common steers is lower. MSC specialists do not advise as much finish on such animals. Heavy-framed dairy steers can make as good cheap gains as beef steers, but the yield of high quality cuts will be less. Steers generally make faster daily gains than heifers, but heifers fatten more rapidly and reach the same slaughter grade earlier.

Body conformation and inheritance of feeder animals are other major points to consider. Animals should have large and efficient

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digestive systems. They should be big-boned and have good wide heads. They should be strong-topped and have good depth of body, yet be smooth. They should have a quiet disposition. A bull's weight at 15 months of age and his rate of gain on full feed are good indications of what can be expected from his calves.

Several methods of cattle feeding are open to farmers. But regardless of which program you follow, it should be planned so that it will be related to the productive capacity of the farm. It should be adapted to the capability of different parts of the farm. Level, hilly, stony and swampy land have different best uses. Buy the kind of cattle that will make the most efficient use of the crop that can best be raised on your farm. Fit your feeding program to your personal likes. You'll do a better job doing something you like.

Keeping a beef breeding herd is the safest type of cattle enterprise, because the cost of investment can be spread out over several calf crops. Raising beef cows and calves is definitely a pasture-roughage program and is best adapted to areas where that kind of feed is available. Beef cows can fit well into existing farm enterprises. Avoid fattening beef cows. It's more expensive and is not necessary. Finley suggests working up to a beef cow herd of at least 20 head. That number is enough to make keeping one sire worthwhile. It is also big enough for farmers to realize the importance of parasite control, dehorning and castration.

Feeding heavier steers is the most speculative—the riskiest type of feeding program. But demand for such steers is high. Heavy cattle eat more cheap roughage, make more rapid daily gains and allow the owner to turn his investment sooner. But because of small margins only experienced cattlemen should be handling this type of cattle. On the other hand the heavy cattle are not as likely to go off-feed.

Another good beef program is to handle light but thrifty choice feeder calves. Calves weighing 400 pounds can either be full-fed on dry lot to gain 600 pounds in 11 months or to gain 450 pounds in 7 months. Or they can be roughed through the winter, pastured through the summer and then fattened on full feed until January.

A cost comparison of 2 ways of feeding steer calves to use farm crops to good advantage has been worked out, starting with calves that cost $40 a hundredweight. If a 413-pound calf were put on full feed from November to June the feed cost for 460 pounds of gain would be about $21.23 a hundred. The necessary selling price would be $30.10 a hundred. If a 410-

pound calf were wintered lightly from November to May, pastured from May to September and put on full feed until January, the cost of gain would be an estimated $16.56 a hundred. The necessary minimum selling price would then be $26.48 a hundred.

Marketing can be spread out over a longer period of time, thus making it safer, by feeding both steers and heifers. Heifers started at the same time as steers should be marketed 30 to 60 days earlier. If fed until the steers are ready the heifers will have too much fat on them.

But regardless of which program is followed beef cattle should be fed as efficiently as possible. That means including enough good protein supplement in the ration, and having salt, water and minerals available to the animals at all times. Be sure to spray the cattle, especially the young animals, with lindane to control lice and mange. Isolate any sick animals, and consult your veterinarian promptly. Increased feeding efficiency may be had with an improved hay and pasture program. If hay and pasture yields per acre can be increased and soil fertility maintained, the farmer won't have to drive his machinery over as many acres to get the feed supply he needs for his livestock.

If your are in the cattle feeding business now—stick with it, advise the MSC specialists. It's usually poor business to switch to something else when you have the buildings, equipment and other overhead investment for a beef program. Finley points out that choice calves that cost $40 a hundredweight can sell for considerably less per hundredweight after 11 months of dry lot feeding and still show a profit.

For example, a 400-pound calf is started on full feed on November 15th and fed so that it will weigh 1,000 pounds on the following October 15th. The 600 pounds of gain would have to be made at the rate of 1.8 pounds per day. Each 100 pounds of gain would require about the following feed amounts and costs: 500 pounds of grain, at $3.25 a hundred, equals $16.25; 70 pounds of soybean oil meal, at $4.50 a hundred, equals $3.15; 700 pounds of corn silage, at $12 a ton, equals $4.20; 200 pounds of hay, at $20 a ton, equals $2. That makes a total feed cost of $25.60 per 100 pounds of gain.

If the calf weighs 400 pounds when it is bought, and if the purchase price is $40 a hundred, the total buying price would be $160. Then if each 100 pounds of gain costs $25.60 in feed, and the calf gains 600 pounds, the total feed cost would be $153.60

The total cost of the calf and the feed would be $313.60. The 1,000-pound calf, which originally cost $40 a hundred, could

thus sell for as little as $31.36 a hundred without actual cash loss. Twenty per cent can be added to the cost of gain to cover death losses, labor, interest on investment and overhead. Add $30.72 to $160 and $153.60 to cover these things. The total cost is then $344.32. The necessary minimum selling price to pay for calf, feed and investment would thus be $34.43 a hundred.

Fifty Years of Plant Science

Condensed from the Acco Press

A GOLDEN ANNIVERSARY is something to be celebrated, whether to mark a milestone in business, or in public service. The United States Department of Agriculture has had fifty years of achievement during the period of service of its Bureau of Plant Industry, Soils, and Agricultural Engineering. At the Bureau's headquarters in Beltsville, Maryland, a three-day celebration was held October 24–26, to mark the fiftieth anniversary of the founding of this important branch of the USDA.

What has been happening in agriculture in this twentieth century is so fast-moving and fantastic, it seems like an "Alice in Wonderland" narrative. Recently, the Committee of Agriculture of the House of Representatives prepared a report on "Research and Related Services in the United States Department of Agriculture." Cataloguing the research in progress in this country, it has become known as "The Pace Report," named for its chairman. That report, while dealing with all phases of research, centers largely on the work of the Bureau of Plant Industry, Soils and Agricultural Engineering. It is interesting to examine it and discover that agriculture has made more progress in this country in the past 75 years than in the previous 7500 years elsewhere in the world. The greatest part of that progress has been in the fifty-year life of the BPISAE.

Although research provided the original impetus for this golden period of American agriculture, it was accompanied by the growth and development of the country

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Houston, Texas, October, 1951

as a whole—expansion of agriculture, the upsurge of industry, transportation, and communication. The Extension Service, federal and state is taking research directly to the farm. The agricultural outlook work and marketing services, such as crop reports, official grades and standards, and the market news service, developed jointly by the USDA and State Departments of Agriculture, have played vital roles. Research and development work by industry has been indespensable. In fact, all additions to man's knowledge everywhere have contributed directly or indirectly to the transformation of our agriculture, the Pace Report points out.

To a farmer, research means hybrid corn, disease-resistant crops, better control of insects and weeds. It means chicks and pigs that grow faster with greater efficiency, and dairy cows that give more milk and butterfat. It means more intelligent use of his soils and forests, and better methods of marketing what he has to sell. In short it means a better living and a better way of life.

To agriculture as a whole, research means an increase of 45 per cent in crop yields in the last 25 years, 20 per cent more milk per cow, and an even greater increase in eggs per hen. It means a doubling of over-all efficiency in the last 50 years. In 1900, one farm worker produced enough for himself and seven others. Today, that farm worker produces enough for himself and fourteen others.

To the nation as a whole, agricultural research has meant assurance of ample food supplies, and the saving of lives, through better nutrition for everyone. Better understanding of food value and modern methods of refrigeration and distribution have greatly improved diets in this country. Knowledge of the importance of vitamins, proteins, iron, and calcium in the diet has resulted in a shift from high calorie-content foods to the protective foods, such as meat, fruit, eggs, vegetables, and milk.

In crop production research, one of the great fields of work of the Bureau of Plant Industry, Soils and Agricultural Engineering, hybrid corn is no doubt the greatest food production story of the twentieth century. Increased yields from hybrids are enough to provide an extra 35 pounds of pork for every man, woman and child in this nation. *Translated into dollars, this extra corn is worth enough every year to pay for all the research ever done by the United States Department of Agriculture.*

The story of hybrid corn begins nearly 100 years ago with Gregor Mendel, an Austrian monk, who in 1866 cross-pollinated garden peas and observed the result. Although his published

work gathered dust for a third of a century, it was re-discovered and became the basis of our science of genetics, which dates from about 1900. Mendel's name continues to live in modern scientific terms as the Mendelian ratio in heredity.

Two plant breeders in widely separated locations in this country crossed inbred lines of corn. Both observed hybrid vigor, and saw its implications in increasing yields of corn, although neither was looking for practical results. They were pure scientists, looking for principles rather than practical applications. BPISAE records for 1905 reveal: "First report made on a cross involving inbred lines of corn."

For the next few years, much time and talent went into research on hybrid corn. It was 1917, however, before its real potentialities were opened up by work at the Connecticut Agricultural Experiment Station that resulted in double crosses, the basis of all our present hybrids. Another decade passed before the public heard much about hybrid corn, but plant breeders were busily building inbred lines that would combine well to create hybrids adapted to specific areas. In an effort to speed up progress through exchange of breeding material, twelve states joined with the USDA in a cooperative hybrid corn breeding program in 1925. This joint effort did much to bring about the phenomenal spread of hybrid corn across the Corn Belt.

Like a prairie fire, this new kind of corn swept across the central part of the country. In 1933, only one acre out of each one thousand in the United States was planted to hybrids. Ten years later, 51 per cent of the corn was planted to hybrids. Since then, it has jumped to 81 per cent this year, as hybrids have been developed for new areas of the South. Hybrids boost yields by an average of about thirty per cent. For the whole country, this means three-quarters of a billion extra bushels of corn every year, worth approximately three-quarters of a billion dollars at farm prices.

The magic wand of science has touched many other crops in addition to corn. How science saved our cereal crops, through the breeding of disease-resistant varieties, and assured adequate supplies of a primary food crop, is another fascinating story of the contribution of the plant scientists.

The USDA's work with the cotton plant dates back to 1899, two years before the founding of the Bureau of Plant Industry as a specific unit of the Department of Agriculture, when a South Carolina cotton plantation owner asked for help in developing a strain of cotton resistant to wilt,

a soil-borne disease. A USDA scientist from Vermont who had never seen cotton growing was sent to tackle the problem, and he and the South Carolina farmer made history by deliberately planting selected seed on wilt-infested soil, and saving plants that survived. Several new varieties were produced from this work.

In the years since that South Carolina experiment, the cotton plant has been the beneficiary of almost continuous research. It was re-designed to meet the threat of boll weevils, then the requirements of mechanical production, and now another major overhauling appears to be in the offing.

Today, plant scientists of the BPISAE in cooperation with private industry breeders, are developing new and vastly different varieties that offer enormous potentialities for cotton to compete with synthetic fibers. They are developing triple hybrids with fiber strength almost double that of present commercial varieties. These triple hybrids aren't for release yet but they are far enough along so that several strains are now included in spinning tests. The germ plasm for these promising new cottons was obtained from three sources—an Asiatic variety, American upland cotton, and a wild species that grows in the mountains of Arizona.

What has been done for wheat and cotton has been duplicated in most of our major crop plants in the fifty years that the Bureau of Plant Industry, Soils, and Agricultural Engineering has been serving American agriculture as a unit of the United States Department of Agriculture. Thousands of improved varieties have been developed that thrive better under specific conditions. Some are resistant to insects as well as diseases, while others are more tolerant of drouth, heat, or cold—some combine many of these qualities. Still other varieties yield better quality food or industrial products.

Agricultural research touches the lives of all of us, whether we realize it or not.

When the old Bureau of Plant Industry and the Bureau of Soils were established in 1901 as separate units of the U. S. Department of Agriculture, later to be merged and expanded, cooperative work was already in progress with thirteen State Experiment Stations. The Bureau of Plant Industry began with a staff of 42 members, headed by Dr. B. T. Galloway as chief.

In the 1899 Yearbook of the USDA, Dr. Galloway proved that he had a vision of what was to come, when he wrote: "The pathology of the future will not stop at the mere correction of conditions involving the loss of a crop or a part of a crop. It will put within the power of the intelligent grower knowledge that will

enable him to forestall injuries by furnishing conditions best suited to the development of the plant. Plant breeding will enable us to attain ideal forms. Selections will make it possible to fix these forms with certain limits. Nutrition goes hand in hand with breeding and selection. Chemistry and physics play important parts and in the study of pathological phenomena themselves, other branches of science will be brought to bear."

How broadly the work of the Bureau has expanded is shown by the 1951 figures: research in progress on 925 line projects at 183 locations in 45 states, Puerto Rico, Nigeria, and nine Latin American countries; 2,192 full-time employees, 925 of them scientists; a budget of $10,844,000.

Milestones in Research

The year-by-year summary of findings of this division of the USDA's work is interesting, for these are milestones in American agricultural achievement. Here are some of those milestones:

1901—Investigations begun to find adaptability of imported fruits in commercial fruit districts.

1902—Research authorized in soil bacteriology and plant nutrition.

1903—Ladino clover introduced from Italy.

1904—Detection of adulterated field crop seed begun. Tung introduced from China.

1905—Research begun on dryland agricultural and horticultural development in the Great Plains States, and on crop production under irrigation. Trebi barley introduced from Asiatic Turkey. First report made on a cross involving inbred lines of corn. Fusarium wilt resistance established in upland cotton, and the Dillon variety released.

1907—Acala cotton introduced from Mexico. Self-boiled lime sulphur found most satisfactory and least harmful fungicide for control of peach brown rot and apple scab.

1908—Beginning of introductions which established the date industry in the United States. Yuma, American-Egyptian cotton, released in the Southwest. Research begun on the domestication and improvement of the wild blueberry.

1909—Uniform tillage and rotation experiments established in semi-arid regions. Research begun on precooling fruit before transcontinental shipment. Hegari sorghum introduced from Africa. First bulletin on forest tree diseases pub-

lished. White pine blister rust discovered.

1910—Ladak alfalfa introduced from India.

1911—First recommendations made for cotton improvement on a community basis. Intensive fertilizer research begun with potash fertilizer resources in the United States. Moisture equivalent device developed to measure water-holding capacity and wilting point of soils.

1912—Cooperative rice research established in California, leading to rice industry in that state. Cooperative farm wind-break demonstrations and testing begun in the Great Plains.

1914—Studies begun on the fixation of atmosphere nitrogen for fertilizer. The citrus nematode found to occur in California. Federation wheat introduced from Australia.

1915—Studies initiated to develop furnace process for the production of phosphoric acid and phosphatic fertilizer; to improve design principles of farm machinery and farm buildings; to make uniform regional wheat variety tests. Concept of soils as a living organism adopted as a basis of soils research. Principles of soil moisture behavior under semi-arid conditions announced—this exploded the popular "capillary rise" and "dust mulch" theories. Cause and method of citrus canker determined.

1916—Research begun on diseases of corn, and on soil colloids.

1917—Plant Disease Survey initiated. Cooperative plan for labeling field crop seeds set up with seed industry.

1918—Research in bud variation of citrus fruits stimulated great improvement through the propagation of valuable sports. Discovered that physiologic races in stem rust attack different varieties of wheat.

1919—Korean lespedeza introduced. Mosaic in sugar cane noted in Eastern Louisiana. Oiled paper wraps found to be effective in control of apple scald. First variety of tobacco resistant to black root rot released.

1920—Discovery that length of day controls flowering and seed production in many plants announced. Proof established that bacterial wilt in cucurbits overwinters in a hibernating insect, and that aphids transmit sugar cane mosaic. Breeding program to im-

prove lettuce initiated. Systematic study of soil profiles accepted as the basis of soil classification in the United States. Study of soil chemistry in relation to soil classification begun.

1921—Relationship between plant injury and magnesium deficiency in soils established. Deep placement of organic manures found to control root rot in cotton. Practical methods devised for commercial bulb production in the United States. Research inaugurated on sources of crude rubber in the Western Hemisphere.

1922—Federal-State research inaugurated to develop inbred lines for hybrid corn.

1923—Economical field over-wintering method devised for production of sugar-beet seed.

1924—Sericea lespedeza introduced.

1925—Abaca introduced from the Philippines for production in Panama. Marglobe tomato released. Research begun on quality of irrigation waters, and on varieties and methods suited for production of fall-sown flax in the Southwest.

1926—Regal, the first smut-resistant variety of wheat for the Northwest, released. Studies inaugurated to find relation of storage temperature to apple softening, and to improve muskmelon varieties.

1927—Victoria oats introduced from Uruguay. Russian wildrye introduced from Siberia.

1928—Released the first improved variety of sugar cane resistant to mosaic, and the first combine-type of grain sorghum. Patent issued for improved process in drying seed cotton at the gin. Proof established that most soil clays are composed of crystalline materials.

1929—National potato breeding program organized. Aerial photographs first used for soil maps. Value of fans in refrigerator cars demonstrated. Chemical dips developed to prevent sap stain losses in green lumber.

1930—Blakemore strawberry introduced. High degree of crown rust resistance discovered in Bond and Victoria oats. Research begun on fruits and vegetables suitable for freezing. Improvement of red clover varieties begun.

1931—U.S.I., the first curly-top-resistant sugar-beet, and the Katahdin potato re-

leased. Selenium in plants shown to cause death of range animals. Magnesium deficiency in soil detected through injury to the tobacco plant.

1932—Zinc deficiency established as cause of pecan rosette.

1933—Four lines of hybrid corn and Golden Cross Bantam sweet corn released to growers. Breeding of onion lines for hybridizing begun.

1934—Value of shelter-belt planting demonstrated at the Great Plains Field Stations during the Dust Bowl days. Procedure for rating kinds of soil by productivity and expected crop yields developed. Findings showed need for early removal of excess apples from the trees to stabilize production of the crop. Thatcher, the first wheat variety highly resistant to stem rust, distributed in the hard-red-spring area. The first flue-cured tobacco varieties with resistance to black root rot released.

1935—Pangola grass introduced in Florida. Manehar brome introduced from Siberia. Research begun to control bindweed. Powdery mildew - resistant cantaloupe No. 45, U. S. Refugee No. 5 snap bean, and the first hybrid popcorn released.

1936—Soil moisture measurement at seeding time established as a guide to wheat yields. Methods devised to prevent heart rot in young sprout oak stands.

1937—First effective treatment devised to control tobacco blue mold.

1938—Research begun on chemical plant growth regulators, and on tung production. The first amphidiploid cottons paved the way to use triple hybrid cottons in breeding. Sugarbeet variety U. S. 15, both disease-resistant and nonbolting, released. Virus found to cause phloem necrosis in elms.

1939—First standard-density press for cotton gins developed. Effectiveness of growth chemicals for preventing fruit drop discovered. Jordanola almond released to growers. Controls developed for canker stain in plane trees.

1940—First variety of waxy grain sorghum, first flue-cured tobaccos with resistance to black shank, and the Pan-America tomato released. Research begun on role of polyploidy in genetic research. Design principles of flax de-seeder made available. Research inaugurated

on cooperative Hevea rubber program with thirteen Latin American countries.

1941—U. S. 13 hybrid seed corn, Tama and Vicland varieties of smut-resistant oats distributed. Golden nematode discovered on potatoes on Long Island, N. Y. Principle devised for using a shell of circulation spaces in walls and floors of potato storage bins.

1942—Defoliation first used to aid mechanical harvesting of cotton. Safe limits of moisture for grains in storage established. Three canning cling peach varieties, the Lincoln soybean, and the Glenn Dale azaleas released to growers. Soil cover found to prevent decay in houses without basements.

1943—Research begun on vitamin content of fruits and vegetables, and on the use of new nematocidal soil fumigants. Methods developed for reversible air circulation in refrigerated storages. Successful fungicidal control devised for South American leaf blight of Hevea. Improvements in decay inspection criteria increase aircraft plywood supply.

1944—Plant growth regulators used to kill weeds. The first hybrid onion, Oxford 26, the first wilt-resistant tobacco, and the Dixigem peach released. Research begun on sugar cane production and harvesting machinery. USDA-seed trade cooperative plan inaugurated for the release of seed of improved varieties of vegetables. A farm-size peanut sheller developed for seed peanuts. Bahia grass introduced from Argentina.

1945—Research begun with radioisotopes from the atomic pile, on toxicity of new insecticides, on pre-development of newly irrigated lands in Columbia and Lower Colorado River basins, on a world soil map, and on the relation of moisture-fertility-stand to crop yields. Male-sterility factor discovered in sugarbeets. Interspecific cross provided the first breeding material for wildfire-resistant tobacco varieties.

1946—Demonstrated the use of selected weed killers in cereal crop production, and the value of slatted floor hay drier in the Southeast. Research begun on soils of Alaska, and on cotton production and harvesting machinery. Clinton and Benton varieties of

oats, superior for the Corn Belt, distributed. Feeding unit developed to deliver dust at a constant rate to nozzles in crop dusters.

1947—Internal surface of clays measured. Federal - State program of plant introduction begun. Five corn hybrids resistant to the European corn borer, and Acala 4-42, superior new cotton for California, released.

1948—Growth regulators shown to prolong blooms on certain ornamental shrubs. Nematodes shown to limit mushroom production. Methods and equipment devised for preparation of radioactive phosphates.

1949—Cooperative project begun to increase foundation seed stocks of improved grasses and legumes. Basic soil surveys initiated for classifying land for irrigation in the Missouri Valley. Salt tolerance established for certain crops during germination. Five improved varieties of tung trees, three new varieties of Chinese chestnuts, and the Congo watermelon released.

1950—Research accelerated to find resistance to wheat rust race 15-B. Interspecific hybrid of guayule originated with 40 per cent more rubber. Top-crop, a superior snap bean, and Dixie Bright 101 and 102, tobacco varieties resistant to bacterial wilt and black shank, released. Research begun on soil management for the Missouri River basin. Apple grader for orchard use devised. Mesquite and other hardwood sprouts controlled with 2,4,5-T. Citrus quality standards based on Bureau findings adopted in Florida. Method devised to accelerate testing of wood preservatives.

And in 1951, Bureau findings are much in the news. Space doesn't permit the cataloguing of all the projects which have been reported on during the year to date. A few examples show the scope or range of the work.

An extract containing hormones obtained from immature bean seeds is extremely potent in modifying growth of plants.

Eighty-four out of 900 organic compounds screened for plant growth regulating activity show potency in inhibiting the growth of plants.

The first two commercial onion hybrids, for the South, one yellow, the other white, will be introduced cooperatively this fall by the USDA and the Texas Agricultural Experiment Station.

Chemical thinning of some 20,000 acres of apple trees in the Pacific Northwest this year was based on BPISAE findings.

Cotton yields may be reduced by too early application of defoliants. In general, 30-day-old boll will not be harmed.

An improved variety of wheat resistant to rust race 15-B is being rapidly increased in Mexico for distribution in South Texas, should it prove adaptable.

These are a few of the highlights of fifty years of plant science. If the findings reported here had been the only ones discovered in the research work of the entire U. S. Department of Agriculture, it would have proved a good investment of taxpayers' money.

Run Your Hens in Shifts

Condensed from the Poultry Tribune

T. K. Wolfe

More and more poultrymen are running their hens in shifts. The purpose of this system is to keep the poultry plant going at full speed all the time. This is done by starting chicks at two, three, and even four different times during the year.

The idea of running hens in shifts is taking hold rapidly. Part-time profits just don't fit in with evermounting expenses.

Poultrymen that I visited gave as their main reasons for keeping their hens in shifts: "*Year-round production and more eggs when egg prices are highest during the summer and fall than when only one flock is kept per year.*"

The hens-in-shifts system, so it is reported, received its backing from hatcherymen who desired a steady supply of good hatching eggs during the summer and early fall, as well as during the remainder of the year, to supply the heavy demand for broiler chicks. And that demand is heavy, as evidenced by the fact that during the past summer in the great Delmarva broiler area alone over three million chicks were placed in houses practically every week. The program, however, is working well also for the poultryman who sells eggs, and must furnish his outlets with a steady supply the year round.

The most common practice seems to be to run the flocks in two shifts per year.

Every poultryman I visited stressed culling of their birds to keep production high. Their state-

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ments ran something as follows: "Cull heavily when the birds are placed in the laying houses." "Cull continually." "Cull every week." "Cull rigidly all the time." "I culled out half the birds during the laying season."

A hen that doesn't lay at least 50 per cent doesn't have much chance of survival, at least for long. And from all accounts the poultryman is doing pretty well profit-wise in the process, despite high costs of production and at times relatively low egg prices. Something that helps is that these hens of the heavy breeds when culled bring a good price when sold for meat.

This hens-in-shifts proposition permits the poultryman not only to get more eggs, but more eggs when he wants them and that's when he can get the most for them. A recent report from the United States Department of Agriculture showed that the average hen in the United States laid 165 eggs in 1949, compared with 112 eggs in 1925. This is an increase of nearly 50 per cent. But the greatest increases had taken place in the first and fourth quarters of the year, the fall and winter months. Hens in shifts can increase egg production during those two quarters and in the other two as well, through proper arrangement of shifts. This shift program, however, was started primarily to step up production in the summer, and it's doing it.

The Virginia State Division of Markets, responsible for testing and certification of laying flocks, reports a very substantial step-up in the number of pullets tested and certified this past summer. The increase is attributed largely to the hens in shifts program. It is motion economy at work in the laying house with the same end in view for which it is used in industry; greater production, more profit, and less effort per unit.

The poultrymen who are running hens in shifts are using other practices such as lights, no roosts, automatic water fountains with heating "pads," and deep litter treated with hydrated lime or superphosphate to keep it dry.

The community nest is being discussed and used to some extent. Its use means cleaner eggs and fewer broken ones, eggs gathered quicker and easier, and less nesting material required, than when conventional type nests are used. At least that's what the advocates of the community nest emphasize.

Thus, more and more poultrymen are solving their problems of higher costs by using practices and methods that reduce work and increase production. Hens in shifts appear to be good profit-wise for the hatcheryman, for the egg producer, whether he is a producer of commercial or hatching eggs, and for the broiler raiser.

Periodic Oil Changes

Condensed from the Ohio Farmer

T. P. Christen

Oil is an essential and vital part of the tractor engine. When the oil runs too low or the oil lines become plugged expensive engine repairs are the result.

Long tractor life is more important to day than ever before, and the tractor owner should give the matter of draining oil periodically a great deal more attention than is ordinarily done.

Various methods are used to provide effective lubrication of the tractor engine—such as splash, gravity, or pressure feed or combinations of these methods. With a force feed or pressure system, all the principal bearing surfaces such as the main and connecting rod bearings, camshaft bearings, valve tappets, timing gears or chain, and piston pins are lubricated under pressure. In some cases, oil must be forced through drilled passages. Oil spray from moving units lubricates the cylinder walls.

Motor oil has many important functions in the tractor engine. The oil lubricates—it provides an anti-friction surface between moving parts. Clean oil allows parts to move more freely, gives more power to the engine, and minimizes wear.

Oil seals. Oil produces a better seal between the piston and cylinder wall. Regardless of how well the rings are fitted the engine does not have good compression until the oil is added. Since good oil helps seal the pistons it permits full compression in the combustion chamber. More of the explosion force goes into power instead of blowing past the pistons. Therefore, gasoline is saved.

Oil cools. Oil circulates through the engine absorbing heat and carrying it to the crankcase. If the crankcase is clean and free from deposits, it acts as the oil radiator and releases the heat harmlessly. Periodic drains keep the crankcase clean.

Oil cleans. Oil in the crankcase is subjected to the intense heat of eight to ten million explosions when the engine is operated the equivalent of 1000 miles. Combustion produces soot, most of this soot goes out the exhaust, but some of it contaminates the oil. A good detergent oil will hold this soot in suspension so that it can be drained with the oil. Dirty oil

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Cleveland, Ohio, December 1, 1951

wastes power and money.

The internal combustion engine discharges some "ashes" from its combustion into the oil upon which it depends for its lubrication, cooling, sealing, and cleaning action. That's why we drain oil.

Oil filters are well worth using. Tractor oil filters are of the "by pass" type. About one out of every 32 quarts of oil pumped by the oil pump goes through the filter. In the course of a day's operation, most of the oil has passed through the filter many times.

The oil filter removes solid materials from the oil. Any contaminants that are in solution in the oil will not be filtered out. For instance, unburned gasoline and any acids present will not be removed by filtration. That's why we cannot safely rely on the oil filter above to bring our oil back like new. We must rely on periodic oil drains for a complete job. We must co-ordinate our oil filter changes and oil drain schedule for best results.

The oil filter should be changed when the oil appears to darken prematurely after an oil drain. If the oil appears "muddy" long before our oil drain schedule calls for an oil drain we should look to the filter. Many successful farm operators are changing oil and oil filters once a week during the heavy months for tractor operation. They can see how it pays in the dollar and cents column.

The oil drain schedule itself varies for the average drain period according to the make and model of the tractor. Official tractor manufacturers' recommendations vary from 30 to 200 hours for various models. Therefore, we should first consult the operator's manual for our particular tractor to determine a good average drain period. Then we should work from there to make our own schedule fit the individual operating conditions.

Generally, oil should be drained and the crankcase refilled when examination discloses that it has been discolored by dirt, thinned by dilution, or thickened by contamination to such a degree that the oil is considered unfit for further use—no longer capable of performing its vital function.

The ideal way to tell when the oil should be drained is by analysis of oil taken from the bottom of the crankcase while it is hot. This is not usually possible because the average person does not have the equipment necessary to secure and analyze such a specimen.

The oil level measuring stick shows the quantity of oil in the crankcase. While it does not serve as a perfect means of examining the quality of the oil, it is the quickest way for the owner when he services the engine.

Examination of the specimen of oil taken up by the measuring

stick and comparison of this specimen with a sample of clean, fresh oil can usually determine whether or not an immediate oil drain is necessary.

The use of a heavy duty type oil with regular oil drains eliminates the necessity for engine flushing. However, if a non-detergent type oil is being used, it is usually desirable to flush the engine several times a year. A regular flushing oil should be used for this job. Kerosene is not very satisfactory. It does not have the solvent properties of a commercial flushing oil.

Your own experience may help you decide upon certain periods of time at which oil should be drained. Always drain oil when hot. That way you get all possible dirt from the engine. To be on the safe side, change oil as soon as its appearance would indicate that it is worn, dirty, or diluted. It's better to be on the safe side rather than be sorry.

Weather Signs—Fact or Fable?

Condensed from Iowa Farm Science

Gerald L. Barger

WET MOON—dry moon—ring around the sun. What should we believe? Some of these old weather signs are based on facts. Others are completely unfounded. Let's sort out a few of the facts and eliminate some of the fables.

Ring Around Sun

A ring around the sun (or moon) often *does* precede rainy weather. This ring—or halo as it's often called—is caused by the light of the sun being refracted as it passes through a thin layer of high clouds. These clouds, called cirrus, are higher than the freezing level and are made up of ice crystals rather than droplets of water. A halo is ordinarily at least 6,000 or 7,000 feet high.

Cirrus clouds, in a thickening and lowering layer, indicate a flow of moisture into a region. Although, like all signs, it's far from foolproof, this inflow of moisture aloft precedes rain. It is the inflow of moisture, not the halo, which brings rain, but the halo is an effective means of identifying cirrus clouds which often precede rain. Thus the ring around the sun is a weather sign based upon fact.

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Ames, Iowa, May, 1951

Phase of Moon

The phase of the moon, however, bears no known relationship to weather—wet or dry, hot or cold. In the first place, interpretations often contradict each other. One says the moon is wet because the farmer can hang his harness on it—rain will keep him out of the fields. Another says the same moon is dry because it's tipped so that no water can run out of it.

Nor does any experimental evidence exist to support the contention that you should plant your crops during a certain phase of the moon. Good seed, proper seedbed preparation and fertilization, weed and pest control, and a little luck with the weather will assure your bumper crop—not a phase of the moon.

And luck with the weather can't be attributed to the moon either. The proof of any cause and effect is in prediction. If there were any real cause and effect relationship between phases of the moon and the weather, forecasters would be only too happy to make use of it.

Animal, Plant Prophets

Animals often are cited as weather prophets, as are certain plant characteristics. If falling barometric pressure, for example, causes a given reaction in an animal, then that reaction is a reliable indication of stormy weather. But changes in the barometer don't influence the weather more than a few days in advance. Animals can't tell you what the weather will be like several weeks or months from now.

Most animal signs are attributed to farsighted preparations for a hard winter—or a mild one. But animals don't look that far ahead, not even as well as we do. Animals respond to conditions they've already experienced, not to coming conditions. A heavy coat of fur may be the result of cold weather already past but certainly not the result of cold weather yet to come.

Plant characteristics are determined even more definitely by the conditions in which they've been living. They have absolutely *no* thought for the future. They do *not* tighten their seed coverings to prepare for an unusually cold winter.

Wind Directions

There are some other very reliable weather signs, however. An east wind in Iowa quite often brings rainy weather. An east wind usually means that a low-pressure area is passing south of us.

Winds blow counter-clockwise around a low-pressure center. Had the "low" passed north of us, we'd have experienced the westerly winds associated with its southern portion instead of the

easterly winds along the northern sector. To complete this circle, air travels from the south in the eastern portion and from the north along the western edge of the low-pressure center.

If the low passes to the south of us, it means that warm, moist air from the Gulf of Mexico is being carried up over colder, heavier air at the ground level. The warm air is cooled, and its moisture is condensed out as rain.

If the low passes to the north of us, and we therefore get westerly winds, the precipitation area is north of us, and we don't get much rain. An east wind won't always bring rain, but as weather signs go it's a good one. It has a basis in fact.

Bunions, Joints

The time-honored bunion or rheumatic joint may not be such a bad weather prophet either. It's not difficult to presume that increasing humidity, changing barometric pressure or temperature, or a difference in cloudiness might cause a very noticeable reaction in an afflicted member of one's body. Thus such signs may have a basis in fact.

Rains on Monday

"If it rains on Monday, it'll rain three days of the week." This may have some truth in it because rains do tend to occur on consecutive days. But if it rains on Wednesday, it is still just as likely to rain two more days during the next six. Most rains apparently don't care or know which day of the week it is anyway.

Sun Spots

Sun spots have been studied for years by scientists. Their appearance can be predicted with fair reliability by astronomers. And sun spots do affect the amount of radiation reaching us from the sun. Any change in the amount of light and heat received from the sun could well be influential in determining the circulation pattern of our atmosphere.

But as in the case of the wet and dry moon, there's no definite agreement as to whether a maximum of sun spots causes wet or dry weather. The effects upon our atmosphere just aren't big enough to be measured readily.

Sun, Moon Positions

The positions of the sun and moon with relation to the earth determine the rise and fall of ocean tides. Tides can be predicted quite accurately. Likewise, the sun and the moon have an attraction for the atmosphere which surrounds the globe. Attempts have been made to forecast weather far in advance from knowledge of these atmospheric tides, but to date no accepted method has been put forth. These atmospheric tides are quite mi-

nute anyway.

Times of Year

All sorts of relationships between different times of the year are heard. A hot June means a hot summer; an abnormally cold winter will be followed by a very hot summer . . .

There is a noticeable persistence to certain kinds of weather, and tomorrow tends to be like today a great deal of the time. But to make long-range predictions from such relationships is being rather optimistic.

Test Reliability

If you have a pet method of predicting weather, you're probably quite honest in thinking it reliable. But have you counted failures as faithfully as successes? Most of us tend to remember *after* an extremely cold winter that the husks on the corn were tight-fitting the previous fall.

The important thing is to make your forecasts for specific periods of time in the future. Then religiously count all successes and failures. Don't rely on memory alone—write them down. Repeat your experiment time after time.

Don't be downhearted if you fail about as often as you succeed. Hundreds of trained scientists are working full time at both private and government expense seeking "weather signs" that are reliable. They are making progress bit by bit and are discovering some facts.

No one yet has devised a scheme for predicting weather for a small area more than a few days in advance. And even those few days, or one day for that matter, cause forecasters plenty of trouble.

Sort Them Out

Don't put your faith in too many of the old weather proverbs you hear. Sort out those which are based on atmospheric conditions—cloud characteristics, wind shifts and things definitely a part of the weather.

Many of these may be helpful. Every trained forecaster knows that a long-time resident of a farming community can make a quite accurate forecast of tomorrow's weather. He uses no charts or maps and appears to make the forecast "out of his head."

Actually he doesn't do it that simply. He is, perhaps subconsciously, bringing together his observations of the past few days in the light of years of experience in his locality when he makes a forecast. He has watched the wind shifts, cloud formations and changes in temperature and humidity.

But let's beware of signs which have no real basis in atmospheric conditions. Some of them are plausible. Many of them are interesting. Most of them are fables.

New Nursery Methods

Condensed from Soil Conservation

Virgil S. Beck
Soil Conservation Service

ONE of the important projects of the SCS nursery at Tucson is the production of small trees and shrubs for use in establishing windbreaks on irrigated farms in soil conservation districts of southern and central Arizona and New Mexico.

Until a few years ago the bare-root plants were set in soil in paper pots. Because of high temperature and low humidity, mortality ran high and the cost of production was larger than at other nurseries where this type planting was used.

This problem succumbed to the ingenuity of Edward H. Morris, who is in charge of the nursery's technical operations and propagation. Production costs have declined by more than half, and two or three lots of plants now are being produced annually where one lot previously was grown. In 1950 the nursery produced 40,000 trees, mainly eucalyptus, Arizona cypress, and African sumac, and several other species of trees and shrubs in smaller quantities.

What Morris did was to work out a new method of growing seedlings, and a highly efficient way to pot them.

First, he decided to employ benches rather than open beds. This was mainly because he could not lower the pH to any extent in beds. The eucalyptus seedling is unusually sensitive to alkaline conditions and satisfactory growth cannot be made if the soil has a pH much above 6.5.

By using concrete benches, Morris found that the pH can be reduced easily by using sulphur and sulphuric acid. The salts then are leached out after the soil has been treated.

Another reason for using benches is that there is less damage from insects than in open beds, and they are more easily controlled. The plants can be kept free of root-rot fungus and nematodes.

Morris says he has learned that the soil should be at least half organic matter. This aids growth and facilitates balling. Plenty of humus binds the soil together, so that the balls are compact and easily handled. Morris had diffi-

Reprinted from Soil Conservation, Washington, D. C., October, 1951

culty in getting this condition in open beds, but it is easily obtained in the benches.

It was found that the seedlings should be grown close together in the benches, a spacing of 3½ to 4 inches between rows being satisfactory. If they are not, several branches form near the ground and the plants do not lend themselves well to balling. Plants are balled out when they are from 4 to 8 inches high, and are grown in the balls until ready for use. Plants larger than 8 inches are very difficult to handle. They wilt easily, and, once wilted, may be lost.

Morris outlines his plant-producing system thus:

1. The concrete benches, 5 feet wide and 48 feet long, are filled with soil and compost, half and half.

2. The soil is treated with 1 pound of sulphur to 20 square feet and 1 gallon of sulphuric acid to 100 square feet.

3. Leaching. Fine sprays are used to prevent surface sealing. Water is applied for at least 24 hours to remove salts formed from the sulphuric acid.

4. The soil is allowed to dry and then the seeds are planted. Seeds are placed in a shallow trench but not covered. Sprays wash enough soil from the sides of the trench to cover the seeds.

5. Irrigations are of sufficient length to carry the water through the soil and leach out salts formed from the sulphur.

6. Fertilization starts when the plants form their first true leaves, when they are given a light application of ammonium nitrate. This is applied with a cyclone seeder immediately after irrigation. Tissue tests are run frequently and deficient minerals supplied as needed.

7. When the plants are 4 to 8 inches high, they are balled out. The plants then are kept under a fine spray for 2 days during the time the sun is shining. This permits the plants to recover from the shock of balling.

This may seem like a lot of handling, Morris admits, but points out that it is justified by the rapid growth of the plants, and that the bench system gives the possibility of three crops annually. This, he says, can be accomplished only if good seeds are used, the soil is properly prepared, and the plants are given adequate fertilizer in small doses.

In working out his system for balling the plants, Morris put in many hours of his own time studying scientific publications, and consulted with specialists of the University of Arizona.

The balling equipment, which Morris produced himself, consists of a cylinder sleeve insert, 3½ by 7 inches, from a 1941 Ford motor, to which two handles of strap iron are brazed; a push plug welded to

a base; small sheets of tar paper; and a compression stapler.

The soil should be moist but not wet when the balling operations are started, Morris points out. First, the balling tube is placed over the plant and shoved into the soil. A slight twist breaks the column of soil loose from the bed and the plant then can be lifted out. Next, the balling tube is placed over the push plug and the plant is ejected through the top of the cylinder.

The ball then is picked up by placing the index and second finger of the left hand straddling the plant. The ball then is tilted to the left so the fingers of the right hand can be placed underneath. Next, the ball is laid on its side near the middle of one of the small sheets of tar paper. The edge of the paper near the person balling the plant then is rolled over the ball with the left hand. The paper is held in place on the ball while the far edge is rolled forward. This is strictly a wrapping operation and the ball is not moved during the process. Finally, the paper is stapled while the ball is on its side. The balled plants then are placed in boxes and allowed to grow to usable size. Just before shipping, the balled plants are placed in the sun so the soil will harden and make handling easier.

Morris reports that he has removed from the bed and balled as many as 240 plants an hour, and that the average laborer handles about 100 an hour.

How to Make Super-Manure

Like to top-dress your meadow with super-manure? Then get out of the habit of spreading manure just as it comes from the barn. Balance each spreader load with some phosphorus, potash and, yes, even nitrogen. Grass will be well-fed and applications won't need to be as heavy.

Putting superphosphate in gutters is a good practice. It not only adds extra phosphorus to manure but saves nitrogen and reduces barn odors. Fifty pounds of 20 per cent superphosphate for each ton of manure will contain 10 pounds of phosphoric acid. This much superphosphate also saves 2 pounds of nitrogen because it absorbs ammonia that would be lost in air.

Superphosphate is more available for plant use when mixed with manure, says A. R. Midgley, Vermont Experiment Station. Manure clings to phosphate and protects it from fixing agents.

—*Cappers Farmer*

Using Nurse Cows

Condensed from the Holstein-Friesian World

Melvin Scholl

HAS IT ever occurred to you that it might pay you in many ways to raise your calves on nurse cows? While it is difficult to say there is only one best way of raising calves, this writer feels after some experience with this method of handling calves that it is superior in many respects to other ways of calf management. Results from this practice seem to be thriftier, faster-growing, and larger heifers, and all this at a saving in time and labor. Practical? Expensive? What about the loss of the whole milk from a cow for an entire lactation? Before you draw a conclusion about these questions study briefly the facts. You will want to know how many heifers can be raised in a year from one cow by this method. You will then have to decide how much good heifer replacements are worth in your herd. This is important. The future of your herd is tied up in these new born heifer calves. Surely you can spare no expense, no effort to develop them to their utmost capacity.

In the first place, what are the qualifications for a nurse cow? You can save yourself a great deal of trouble and grief if you understand from the outset that not just any cow will do for this important role of foster mother. She will probably be one of our lowest testing matrons. It goes without saying that she will be healthy. She should be a heavy producer so that she will be able to feed three or four calves at a time and she should have the right personality; that is, she should get along well with any and all calves that are put with her. Some cows just naturally have this maternal instinct that reaches out for all calves, while other cows do not possess it except for their own offspring. The latter never make good nurse cows.

Next let us consider the management of this system. You do not necessarily have to have a separate barn for this method of raising calves, but the space will of necessity have to be larger where a cow is placed with a group of calves. Any barn where calves are raised should be clean, sunny, and well-ventilated. The cow may be turned loose in the pen with her calves. She may be

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Lacona, New York, November 17, 1951

tied. She can be placed with the calves twice a day, or she may be with them all the time. I think calves do better when they can feed any time they wish. They can safely drink much larger quantities of milk in this manner than if they are bucket-fed. The nurse cow herself should be allowed to forage in the sunshine for at least part of the day. If she gets her udder muddy, it should be washed before she is turned in with the calves. It is generally agreed that six weeks or two months is the ideal length of time to allow calves to nurse, after which time they are put on skimmilk and a new bunch of calves is placed on the foster dam. Some people think that heifers get patchy if allowed to nurse for longer periods. Whenever a new group of calves is placed with a cow it is wise to see that they are as nearly the same age and size as possible, and to watch closely the first day or two to be sure no calf is being pushed away by the other calves. If such a thing happens, it is well for a time to place the weaker calf alone with the cow for a few minutes before turning the rest with her. Even while nursing calves should have free access to hay at all times. They should have some grain and fresh water. A good time to feed them is while the cow is pasturing. At Maytag Farms we fed Calf Manna along with a little grain to calves that were nursing with splendid results. This added expense is optional. We found sometimes that the cow's teats became chapped from the calves sucking them. If her teats are not kept smooth, the nurse cow will develop the habit of kicking.

Calves raised by this method will be thriftier and grow faster. If properly managed there should be a great saving in labor. There will be no dirty milk buckets to be washed. Calfhood scours will be practically eliminated. Inexperienced calf men can handle calves by this method. Hard milkers that often pose quite a problem when milked either by hand or with a machine offer no handicap for the hungry calf. Indeed, sometimes these hard milkers are helped by allowing calves to suck them. Contrary to the opinion held by many, allowing calves to nurse a cow does not spoil her for later production. For example, one of the truly great cows in the Maytag herd, Bess Ormsy Fobes Maxine, was used during one lactation as a nurse cow. She was a hard milker, and did not milk out well with the machine. After this lactation as a nurse cow she freshened and made 930 pounds of butterfat on three-time-milking. One of the greatest advantages of this method of calf raising is the saving of valuable breeding matrons in the herd. Often these old cows become problems in the milking herd, es-

pecially where machines are being used. They make excellent nurse cows as a rule.

Among the disadvantages of this method seem to be the loss of whole milk, the amount of room needed, and more cleaning out of barns. It is not uncommon for calves that have nursed for two months to be very stubborn when it comes time to switch over to bucket feeding but with a little knowledge and experience, little difficulty should be encountered. We sometimes gave these obstinate calves a little whole milk in a pail before changing them over to skimmilk abruptly. By this time if they have been eating hay and grain and drinking water, they should make this transition to bucket feeding without any hesitation. Removing water for the first day makes the calf more eager to drink its milk. Patience here is the whole secret. Whenever a calf is fed from a pail, it is a good policy to see that the pail is up off the floor. Setting the milk buckets in a feed manger is all right.

This writer feels that whatever disadvantages there may be to this method of raising herd replacements, they are completely offset by the greater benefits derived by adopting it. Also that it is a plan that should receive more general consideration.

Happiest County in the U.S.A.

Condensed from the Farm Journal

Virginia Brown

WASHINGTON COUNTY, TENNESSEE—what a place this is!

The farms are small, but trim and freshly painted. Sleek beef cattle graze in lush pastures alongside fields of ripening tobacco. Not many rich people here—not many poor. But they all seem to get a kick out of living.

Hardly a week goes by without something: an amateur night, a barbecue, a skeet shoot—any of a dozen things they think up.

Washington County was not always so ideal. When County Agent Raymond Rosson came here 24 years ago, the land was playing out. As for neighbors—well John Glaze, a jolly dairyman, will tell you: "People never got together except for fire, flood, or funerals!"

But Raymond Rosson had two

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pet theories that he figured ought to work: First, that the county should switch from general farming to dairying, beef cattle, and tobacco. After that theory took root, the income for the 3,300 families jumped from $1 million during the 20's to $11 million in 1950.

An exciting part of that progress comes from demonstration farms. Every community picks one of its best farmers to try out a new variety of tobacco, fertilizers, hybrid corn, etc. Maybe he gives an acre to the experiment, maybe more. His neighbors watch his work, and if it's a success, others adopt it. One man may run an experiment to see how well or poorly beef cattle or poultry pays out. The results—including the failures—are published for the whole county to note.

In 1935, Rosson launched his second theory, this one about better living. He called together a few people from the cluster of 20 or 30 farms named Leesburg Community.

Rosson started out by asking a few questions: Did Leesburg families want running water and electricity? Telephones? Any way to get the lines built? And the kids—was there any fun for them besides a Saturday "western" in Johnson City?

Leesburg got to thinking. In a few weeks they sent Bob Hannabas to Rosson's office, and he said, "We're ready. Tell us how to pitch in!"

"Organize everybody into a community club. Make up your minds what you want to do, and get going," was the answer. Those three lines contain the secret behind the Washington County story. It's the secret of any community anywhere.

Leesburg became the first community club in Washington County. Now there are 24, and just about every rural resident in the county belongs.

Through their clubs, Washington County people have made their homes, farming, and social life something wonderful to see. I truly believe they could be right when they say they've got the happiest county in the U.S.A.

How did it happen? Leesburg is a good example. People there appointed a committee that visited every home in the community, asking every person—young and old—what he'd most like to have. Some said: "A bathroom." Others: "Let's have something for teen-agers to do besides ripping up and down the roads."

Those "want lists" became Leesburg's goals for the year.

When telephones and water systems started going into Leesburg farm homes, Boone's Creek Community wondered if they weren't missing something. So they drove over the ridge to find out. Result: They started their club and

pitched into a project suggested by their 21-year-old chairman, Ivan Range.

"Our farms are small," Ivan argued, "but our stock is good, even if we have fewer head. Let's brag about what we've got."

So up went attractive signs: Smithdale Herefords; J. B. McNeil and Sons Jerseys. Washington County is building a real reputation for its registered stock.

One by one, every community in the county organized its club. Their accomplishments may sound big, but actually their method is simple.

To keep these communities pulling together—and not against each other, the individual clubs formed a County Council of Community Clubs. Each time a new community club was formed, it became part of this County Council.

Here spokesmen from each of the community clubs meet together and do things such as thresh out ways to help each other, serve as a clearing house for community events, plan county-wide projects that require the co-operation of not just one, but all community clubs in the county. In other words, the Council is a board of directors for Washington County's 24 community clubs.

For instance, when the local power company dilly-dallied about putting up rural lines, the Council had the community clubs do their own surveying, draw maps, route lines and—their charts under their arms—a committee from the council roused the power company to action.

Everywhere young folks are encouraged. Boone's Creek finances one new girl at school each year. Every community has spruced up its school—enlarged the library, bought playground equipment, furnished new typewriters to the business department, modernized the cafeteria. Two communities even hired recreation directors to conduct a teen-age Play Night at their schools twice a week all summer long. During World War II, Leesburg printed a special weekly newspaper just for servicemen, and sent every boy a Christmas package; one year they tucked in a brand new photo of Mom and Pop, courtesy of the community!

The money for all this? It comes from the dozens of fun events sponsored by the clubs all year long. Some bring in thousands of dollars—often the whole county attends, paying 50 cents to $1.50 a ticket.

I was at their Tobacco Festival banquet along with 1,000 other people. "We could have had 3,000," said Hal McBride, farmer chairman, "only there's no place to feed that many."

Afterwards, at a tobacco warehouse, there were 3,000 at the Square Dance. Tickets go to farm-

ers first, then the long list of town people from Johnson City get their chance.

All year long, the clubs take turns putting on fun events for their own members, and frequently invite the other clubs over to join them.

There's a Fox Hunt with its Hound Dog Show, Biggest Liar and Best Bugler contests on Leesburg hill every October; up to 3,000 people come. Boone's Creek has a summertime Game Night; their school gym is filled with young and old from all over, competing at checkers, badminton, boxing.

There's Talent Night at Lamar —that's when each club sends its "most talented" member to compete with the champs from other clubs. Round-Up is a wonderful get-together every spring, with contests in harnessing, chopping wood, husking corn, picking chickens. Champs from every club compete while 2,000 cheer from the gallery.

Their 16 County baseball clubs play every Saturday from April until October, and wind up the season with a "World Series."

"Ten years ago, we couldn't get 15 people together," said Palmer Robinson. "Now every time a light goes on in the school house, we have 200!"

Plenty of serious stuff, too, like the two-day Farmers' Institute (Washington County's own Farm and Home Week), where you're likely to run into nationally-known figures on the program.

How they do all this boils down to one thing: organization. Every neighborhood of 100 or 200 people has a community club made up of Home Demonstration Clubs, PTA, 4-H, FFA, churches, schools, and other civic groups.

And every club sends spokesmen to the Council of Community Clubs, which meets four times a year to keep clubs in touch with—and helping—each other. Each representative in the County Council is a community club member first; if he also represents a church organization, for instance, this church club is merely part of the community club. The Council decides who is going to do what. No Baptists trying to outshine the Methodists, and PTA isn't sponsoring a Bake Sale the same day as the Home Demonstration club.

The County Council is set up to have an equal number of men and women representatives: the two points of view balance each other. In the local club even the children have a voice. When a man or woman is on a committee, the whole family—including the children—have a say.

I asked the sheriff, a judge, a banker, a school principal, and many farmers, the reason for the success of their club. "It's because nothing is pushed down our

throats," they said. "What we want to do, we first decide in our own families, then in the community, then in the County Council. We start off small, with aims *everybody* is interested in. Achieving those aims gives us the nerve to tackle something bigger."

These clubs aren't just farmers' clubs, although they first started with farmers. Everyone who lives in the community belongs—ministers, lawyers, truck-drivers, and storekeepers.

Dr. J. A. Willis, for instance, a gentle, rosy-cheeked man with a thatch of white hair, contributes to his Lamar community club by *giving each family a free physical examination each year.* Women in his club keep the records. Occasionally Dr. Willis finds someone who can't afford the glasses or operation he needs, and the community club pays the bill.

Last year Dr. Willis told his club: "I'll match any amount of money you raise to improve the school." Although his child is grown, he put the first $150 in the kitty, and no one was happier than he when he had to shell out $1,300 more. Young Mr. and Mrs. Roy Stern of Knob's Creek Community open their rumpus room to the whole community every Friday night, or to anyone in the county. Summers, they flood-light their lawn for community croquet, square dancing, horse-shoe pitching.

Naturally, young people like living in Washington County. Several boys told me that they want to stay on here and farm, not only because there's so much to do, but because "*no one laughs at an experimenter here, and dads are always willing to let their boys try a new idea.*"

As you drive over a well-kept Washington County road, winding up the gentle hillsides or beside the brook that once splashed over Daniel Boone's moccasins, every now and then you see one of those pretty white signs: "Welcome to Boone's Creek," or "Leaving Leesburg, Come Again." But the sign which really sums up all of Washington County is the one which reads: "Entering Pleasant Valley."

Anyone would like to live in a happy place like this. And perhaps we can. All it takes is (1) a little leadership to get things started; (2) the kind of community club to carry them out; and (3) both of these elements bound together in a strong county-wide organization—in this case, the Council of Community Clubs.

This council is 3,000 strong. And when you have that many people all working together, there seems to be nothing that's too big to tackle.

Results in Livestock Feeding

Condensed from the Missouri Ruralist

SOME rather surprising results in livestock feeding and management were reported at the Fall Livestock Day program at Missouri College of Agriculture. Pigs that were not wormed did better than pigs that were wormed, self-fed sows and litters ate less than hand-fed sows and litters; trace minerals were beneficial to pigs fed a corn-tankage ration but not pigs on a corn-soybean oil meal ration; and steers on wheat-lespedeza pasture made 46 per cent faster daily gains than steers on ladino clover-fescue, but the ladino-fescue pasture produced the most beef to the acre.

One of the most impressive experiments demonstrated use of antibiotics in feeds. Of all antibiotics, aureomycin appeared best and when it was added to a corn-soybean meal ration for weanling pigs in dry lot, rate of gain was increased by 29 per cent, with 7 per cent less feed required. Aureomycin was not so effective when added to a corn-tankage ration fed in dry lot.

Another antibiotic, procaine penicillin, when added to the corn-soybean meal ration for pigs in dry lot resulted in a 9 per cent increase in rate of gain, and a saving of 4 per cent on feed. This was an average of 5 experiments in which varying amounts of penicillin were fed. When the amount of penicillin was increased results were more nearly like those with aureomycin. Oddly enough, when procaine penicillin was added to a ration of corn-tankage rate of gain was increased by 8 per cent and 7 per cent of the feed was saved.

For a total of 8 different tests with antibiotics fed with a corn-soybean meal ration in dry lot, average gain was increased by 20 per cent with a saving of 5 per cent of feed to produce a unit of gain. The same antibiotics fed with corn-tankage gave an average increase in rate of gain of 6.6 per cent with a 4.1 per cent saving in feed. When fed on pasture, antibiotics failed to increase rate of gain, but there was a 10 per cent feed saving.

In one experiment procaine penicillin was fed to brood sows in dry lot but there was no advantage shown.

What about trace minerals for hogs? In dry lot feeding trace minerals increased rate of gain by 12 per cent and there was a 4 per

Reprinted by permission from the Missouri Ruralist,
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cent saving in feed. Hogs on dry lot got a corn-tankage ration. There was no advantage shown when fed to hogs getting a corn-soybean meal ration. But it's best to be sure your animals are getting needed trace minerals.

Good hog pasture still is a good bet. Pasture-fed pigs grew just as rapidly on a simple ration of corn and soybean meal as pigs in dry lot getting the same ration fortified with B-vitamins, trace minerals and vitamin B_{12}. Cutting green rye and feeding it to sows proved just as good as adding 3 B-vitamins and vitamin B_{12} to their rations.

Best ration of all those studied in the tests was corn and soybean meal fortified with trace minerals, riboflavin, capantothenate, nicotinic acid, vitamin B_{12}, and aureomycin.

Experiments in worming pigs have surprising results but they probably can be explained. First, 2 groups of 40 barrows and 40 gilts were divided into lots of 10 pigs each. All pigs were fed the same balanced ration.

Sodium fluoride was used for worming, with 1 pound of sodium fluoride mixed with 50 pounds of dry, ground wheat. This is double the recommended dosage.

In all treated lots rate of gain was slightly below that of non-treated pigs. Also, in 2 lots treated pigs required more feed.

These first tests were run in 1948—a second experiment was run in 1949. Results were practically the same. This time worm counts were made and indicated that although pigs were infested, removal of worms didn't help much.

A third experiment was conducted last winter with some Yorkshire pigs which were wormy. They were fed 2 weeks, then one lot was treated with sodium fluoride (1 per cent). The treated pigs made an average daily gain of 1.09 and required 333.2 pounds of feed to make 100 pounds of gain. The untreated pigs had an average daily gain of 1.02 pounds and required 333 pounds of feed for 100 pounds of gain.

Still a fourth test was conducted last summer. On the fourth week following the beginning of the test one lot of pigs was treated, and the treated and untreated pigs made almost identical gains. Then during a period of 42 days after worming, rate and efficiency of gain was slightly in favor of the unformed pigs.

So for the average of all experiments in which sodium fluoride was used for worming pigs the treated pigs had an average daily gain of 1.42 pounds, the untreated pigs an average daily gain of 1.47 pounds. The wormed pigs required 381 pounds of feed for 100 pounds of gain, the untreated pigs required only 373.

What does this mean? It em-

phasizes the fact that an ounce of prevention is worth a pound of cure. You can't let pigs get wormy and then give them a big dose of worm medicine and hope to cure all the trouble. A sanitation program beats worm medicine.

However, we shouldn't quit the practice of worming. Worm expellers have an important part to play in sanitation and a worm-prevention program. Removal of mature female roundworms from the intestinal tract of the pigs will help break the life cycle, for 1 female roundworm is capable of producing millions of eggs during her lifetime.

You would think sows and pigs running to self-feeders would eat more than sows and pigs hand-fed wouldn't you? But apparently they don't. In a test 25 sows with their first litters were divided, and all sows were hand-fed until their pigs were 21 days old, and the pigs were then supplied with the same ration the sow received, either in a creep or in a self-feeder. Pigs were weaned at 56 days old. Sows that were hand-fed were given all the feed they would eat twice daily while feed was kept in the creep for pigs all the time.

Pigs that had access to feed in the creep made an average gain of 17 pounds a pig between 21 and 56 days. Pigs eating out of a self-feeder made an average gain of 16.9 pounds for the same period.

The hand-fed group ate about 100 pounds more feed to the sow than did the group that creep-fed. This meant an added cost of $3.65 for feed. However, the hand-fed sows lost weight during the lactation period, so had the sows been sent to market the extra weight would have paid for the extra feed.

Lesson taught: Might as well save labor with self-feeding.

The Missouri Experiment Station's work with steers in producing beef from maximum use of roughage and pasture has been closely watched.

How thin can you keep cattle in winter and have them make it up on summer pasture? That's one question being studied. A year ago 40 head of short yearlings, weighing about 600 pounds, were divided into 4 lots. Of these, 30 were fed corn silage and red clover hay in dry lot and 10 were fed only a limited amount of red clover hay on bluegrass pasture. In spring all cattle were first grazed on bluegrass, then one lot went to wheat-lespedeza and the other 3 lots grazed ladino clover-fescue pasture.

On April 20, calves that got short winter rations weighed 622 pounds, while the other 3 lots weighed a little over 800 pounds. On August 29, the short-wintered cattle weighed 849 pounds, making a pasture gain of 213 pounds.

The 2 lots of calves that had better winter rations and were on

fescue-ladino clover had summer pasture gains of 145 pounds and 169 pounds. The other lot on wheat-lespedeza pasture had a summer gain of 230 pounds. However, when the better-fed calves first were put on bluegrass in April they lost weight, so actually the net gain from pasture for the lespedeza-wheat-grazed calves was 188 pounds, the better-fed calves on ladino-fescue had net gains of 104 and 129 pounds.

The calves on the slim winter ration gained 14 pounds on the bluegrass while the well-fed calves lost about 40 pounds, then gained 227 pounds on the ladino-fescue so the net summer gain was 227 pounds.

But the thinner calves never caught up with the others, were still 73 pounds lighter than the other cattle handled the same way in the summer. Also, the lighter cattle will require more grain to finish them. The more liberal winter feeding ration looked most profitable.

This summer 2 steers to the acre were allocated to the fescue-ladino pasture and one steer to 1¼ acres of wheat-lespedeza. The fescue-ladino pasture would have carried more, perhaps 3 to 4 steers to the acre. The wheat-lespedeza was grazed out completely. Thus, the fescue-ladino made about 350 pounds of beef to the acre while the wheat-lespedeza made only 180 pounds.

But the tests demonstrated what many Missouri farmers already knew—lespedeza is mighty good cattle pasture. The wheat-lespedeza made more gain and more finish—the wheat-lespedeza calves gained 230 pounds, the ladino-fescue calves only 157. And to reach the same market finish, the cattle grazing the ladino-fescue pasture will require more grain.

Carrying capacity of a pasture can often be increased from 100 to 300 per cent through adequate fertilization, mowing, rotational grazing, and the use of adapted grasses and legumes for the region.

—Meaty News

Sundown for the Milk Can

Condensed from Capper's Farmer

Clyde Zimmerman

IT NO longer is part of Harold Palmer's work to lift a ton of milk each day. The milk his cows produce goes direct to a storage tank in the milkhouse, is pumped to a tanker truck and hauled to a dairy.

Palmer, who owns a 320-acre farm in Keokuk county, Iowa, is one of 12 farmers on a pickup route started by the Swaner Farms Dairy, of Iowa City, last July. For Palmer, who is milking 65 cows, bulk handling of milk was a fitting climax in a procession of labor-saving ideas. He started milking in a remodeled horse barn with elevated stalls. Next he built his present 20- by 40-foot milking parlor with stalls for 8 cows and lanes so cows come in on the level and milkers work in 2 pits. His next improvement was a pipe line which sent milk direct from cows to cans. It was a satisfactory arrangement until Jim Swaner and his father, J. J. Swaner, discussed the idea of a tanker route. Palmer decided that the Swaners had the best thing yet advanced for cutting dairy labor to a minimum.

Only big change Palmer had to make in his layout was to trade a can cooler for a 500-gallon stainless-steel tank. This container has hollow walls in which a liquid refrigerant is circulated. Milk flows through a pipe into the tank direct from the cow. Other farmers on the route, with smaller herds, have 150- and 300-gallon holding tanks. Before the truck began picking up milk, farmers filled cans from their tanks by gravity and milk was hauled to the dairy in the old way.

Two days' milking goes into Palmer's cold-wall tank. An agitator circulates milk, cooling it down to 38° F. in from 30 to 40 minutes after each milking. In the evening the first milk is cooled almost immediately to 55° F. and all is down to 50° F. by the time the last cow is handled. On the morning milking, because of the tempering action of the cold milk in the container, the temperature does not exceed 47° F. at any time. Compressor shuts off automatically at 38° F. Palmer says his electric bill for cooling is lower with the holding system.

The truck or "dairyliner" picks up Palmer's milk every other day. The driver "weighs" milk in the tank, using a built-in stainless-steel

Reprinted by permission from Capper's Farmer,
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measuring stick. He also takes a fat sample. Milk is then pumped into the 2,000-gallon stainless-steel compartment in the truck and the driver rinses out the milk room container with cold water. Before milking, Palmer flushes the tank with warm water and a detergent, followed by a chlorine rinse. Federal and state inspectors have given the Palmer setup a hearty OK. However, most of the men on the route think they will be able to expand their herds since dairying takes less labor with the new setup.

What about some of the other advantages of the newer bulk method?

At Iowa City young Jim Swaner stands on the plant floor and points out the receiving room. Tanker pickup on farms may eventually eliminate it, cutting out labor of 1 man and the investment in a can washer.

"The milk can is our worst piece of equipment," he says. "Lifetime of a can is 4 years. Then you must go to the expense of retinning them or buying new ones. With cans a farmer always loses a part of his check because of spillage and stickage. Rapid cooling with bulk tanks promotes better-quality milk. Raw milk coming in from farm tanks frequently will have a bacteria count under 20,000. Of course, we like that low count.

"Farmers who have a bulk tank can produce more milk without enlarging the milkhouse. Take Palmer, for instance. Last week he was getting 27 cans a day. He would need space and equipment for handling those cans. And another thing, a more accurate fat sample is made on the farm than in our weigh tanks where milk is dumped and isn't properly mixed for an accurate composite sample."

The 115 producers who sell to the Swaner dairy have been paying 32 to 35 cents a hundred for milk hauling. Those on the tanker route are paying 25 cents. The Swaners believe the tanker system will cost less and result in even greater savings for producers. Since milk can be picked up on farms every other day, there is a saving. The Swaners plan to have the tanker collect on one route one day and on a second route the alternate day. Edisto Farms Dairy, Columbia, South Carolina, has cost figures on tanker operation for a year. The truck, operating at about two-thirds capacity, hauled 350,000 pounds of milk and traveled 46,000 miles. The dairy was able to haul milk at 20 cents a hundred.

It seems likely that the tanker system will spread in the Midwest. In California more than 50 per cent of all grade A milk is handled in bulk on the farm. This method is expanding in eastern states. Tanker routes are planned in

Wisconsin, Arizona and Indiana. Jim Swaner puts it this way:

"The trend is toward grassland farming. We can utilize more forage with more cows if farmers can solve their labor problems. The bulk-storage idea proves that milk dealers and farmers can work together to reduce labor, promote improved milk quality and increase the profit possibilities of dairy farming."

Killing Weeds With Chemicals

Condensed from the Agricultural Situation

W. C. Shaw
Bureau of Plant Industry
A. P. Brodell
Bureau of Agricultural Economics

THAT weeds compete with crops for water, light, and plant nutrients, is common knowledge. Weeds also increase the cost of labor and equipment, reduce the quality of farm products, and often serve as host plants for insects and fungous diseases that attack crop plants. Some weeds are poisonous to domestic animals and to man.

Much has been known, for years past, about weed control. The use of high-quality, clean seed is a sound starting point in any weed-control program. Farmers have long known the importance of seedbed preparation, and of thorough and timely cultivation, in controlling weeds. The hoe and many types of cultivators were primarily designed to destroy weeds. One of the major purposes of rotating crops is to control weeds and in many areas a cultivated row crop is included so that weed competition may be reduced. Even where these "good farming methods" prevail, however, weeds continue to persist.

During the past 10 years, there have been many new innovations in weed control. More than 100 chemicals have been developed for use in the continuous fight against weeds. Although is is not possible to recommend a specific chemical for every weed or crop, there is a tendency to greatly increase the number of chemicals used, and to use different chemicals for the control of specific weeds under specified conditions.

These chemical weed killers have been developed primarily to supplement cultural practices, not to replace them.

Today chemicals are being used

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as supplemental weed control tools for corn, wheat, oats, barley, rice, flax, sorghums, pastures, cotton, peanuts, sugar beets, sugarcane, and others.

Satisfactory chemical weed-control methods have been worked out for such horticultural and vegetable crops as asparagus, carrots, lima beans, onions, parsnips, peas, potatoes, snap beans, sweet corn, strawberries, tree fruits, and many others.

In using herbicides, the farmer is confronted with a new weed-control technique. It is a challenging new farming method which some farmers are learning to master just as they have the many other complexities of modern farming. The use of chemicals in controlling weeds will undoubtedly play a larger and larger part in farm production in the years to come.

The discovery of the herbicidal properties of plant growth regulating substances greatly stimulated interest in a wide variety of chemicals for weed control. By far, the most widely used herbicide at present is 2,4–D (2,4 dichlorophenoxyacetic acid). The chemical is used primarily as a selective weed killer for the control of broad-leafed weeds in crops tolerant to the herbicide. Thus, it is effectively used for the control of weeds on an extensive scale in corn, small grains, pastures, and hay crops. The chemical may also be used to control annual grasses in certain row crops when used as a pre-emergence treatment—applied before the crop comes up. Farmers have used 2,4–D largely because it is relatively inexpensive, noninflammable, nonpoisonous and can be applied in low volume sprayers—5 to 10 gallons of water per acre.

While 2,4–D is the most widely used herbicide, uses are now being found for many other chemicals such as 2,4,5–T; IPC; TCA; and the dinitro compounds. For instance, it is estimated that 50,000 acres or more of cotton in Mississippi were treated preemergence this year for weed control with dinitro compounds. Last year, in comparison, only experimental quantities of the dinitro compounds were used.

A recent survey conducted by the Bureau of Agricultural Economics indicates the rapid expansion in the use of 2,4–D for weed control in small grain crops and corn. The survey covering 34 States shows that 17 per cent of the acreage of small-grain crops harvested in 1949 were treated for weed control.

These States harvested more than 109 million acres of small grains in 1949, which was about 82 percent of the total. The survey did not include the Southern States and California.

The survey shows that more than 7 per cent of the 63 million

acres of corn harvested in the reporting 34 States in 1949 was treated for weed control. The total acres of small grain and corn treated for weed control in the 34 States totaled about 23 million acres. Some acreage was treated in the States not included in the survey. So it seems likely that a minimum of 25 million acres of small grain and corn were treated that year for weed control.

Ground equipment was used for about 80 percent of the treated acreage of small grain crops, according to the survey. Airplane equipment was little used for weed control in most of the humid States, because in many instances the small grain fields are small and often are adjacent to fields planted to legumes or other crops that are sensitive to 2,4–D spray drift. Damage from drift material is much greater with airplanes than with ground equipment.

In most of the Plain, Mountain, and Pacific Northwest States around 25 per cent or more of the 1949 treated acreage of small grain was sprayed with airplane equipment. In these States, the small grain fields are often of large size and are adjacent to pastures that are not seriously damaged by spray drift. Definite information is not available, but it is believed that practically all of the corn treated for weed control is sprayed with ground equipment. Most of the corn is treated when the plants are from 6 inches to 18 inches high. At this stage of growth, the plant is less likely to be injured by 2,4–D, than at other stages of growth.

In the application of herbicides it is important that the weeds be destroyed as soon as possible after germination. For small grain crops, most of the acreage is treated in the spring after the plants are well tillered and while weeds are small.

The farmer of today not only finds new herbicides with which to fight weeds but he also has new kinds of sprayers with which to apply them. A decade ago farmers bought around eight thousand power sprayers annually. Since 1948 they have bought from 60 to 100 thousand of these sprayers annually. Most of the power sprayers bought before 1945 were built for tree fruits. Now the bulk of them are primarily adapted for field crops. Sprayers are used, of course, for fighting insects as well as weeds.

Moreover, many of the modern sprayers are of the low-gallonage type. Low-gallon sprayers take the same quantity of chemicals per acre as other sprayers. But the low-gallon type require much less water and this is a factor of importance, especially in the dry areas where water often must be hauled long distances.

Chemical weed killers have been used but little in the cotton

areas, where control of weeds is a much greater problem than in other parts of the country, but limited studies, now underway indicate the possibility of their becoming increasingly important on cotton farms. Farmers in all areas can be expected to use the new methods of weed control when they find them profitable.

No Migrant Problem Here

Condensed from Nation's Business

André Fontaine

HOOPESTON, ILL., is a pleasant little city that sits in an oasis of trees amidst the flat, rich, black fields of America's corn belt, about 100 miles south of Chicago and seven or eight from the Indiana line. The impression you get is that it's clean and healthy, with white-painted lamp posts along its broad Main Street and cars angle-parked in the business district. North and south of Main Street the brick-paved residential streets are cool under huge elms. Clipped lawns stretch back to neat white houses. Yet five years ago Hoopeston was a sick town.

It was sick with a social ailment that festers today in thousands of similar towns which make their living from food production and temporarily harbor at harvest time America's 2,500,000 migrant farm workers. In most of these towns migrants are jammed into outlying areas that can be smelled a quarter of a mile away. Since the towns stretch from Maine to California, the collective odor was so strong that President Truman ordered a commission to study the problem and make recommendations for federal action.

Five years ago Hoopeston had such areas; in one camp migrants lived in tents pitched in churned-up muck. Sanitation and cleanliness were virtually impossible. Children were undernourished and, since they weren't allowed in public schools, uneducated.

The migrants were considered third-class citizens. They were segregated in the balcony of the local movie, were not allowed in the parks or swimming pools and in the stores many of the merchants wouldn't wait on them.

Today, Hoopeston has cured its social sore. Edith Lowry, executive secretary of the division of home missions of the National Council of Churches, who knows as much about migrants as anyone in America, says that Hoopeston has done the best job of any town in the country.

Reprinted by permission from the Nation's Business, Washington, D. C., December, 1951

"It no longer has a migrant problem," she said, "because it grasped its migrant opportunity."

The change started three years ago with a meeting in the Chamber of Commerce rooms called by Helen Meserve, a dark-haired, brilliant girl of 25 who had been sent into the migrant camps by the home missions division. She invited representatives from each of the town's social and professional groups—two ministers, two doctors, two each from the senior and junior women's clubs, two from the Chamber of Commerce and one from each of the two canning companies.

One basic fact became clear: without the migrants Hoopeston could not survive. The town makes its living from the canning companies, their huge farms and affiliated industries. Mike Fish, personnel director of the Hoopeston plant of Stokely Foods Company, best described it when he said:

"Most people think of these migrants as a temporary necessity. But they're not—they're going to be with us from now on. Why? Because you can't get local labor to go out into the corn and asparagus fields and bring in the crops. Every year before we recruit any migrants down in the Rio Grande Valley, we run ads in the paper asking for local workers. We get maybe four or five applicants. We need 400 or 500."

Since the migrants were doing so much for Hoopeston, it was agreed, it was up to the town to give them the best it had—equal citizenship. Thus the Hoopeston Migrant Council—with representatives from the churches, medicine, business, the canneries and the women's organizations—came into existence.

The basic trouble was that the Hoopeston people and the migrants were so different. The migrants were American citizens recently come from Mexico. Few spoke English. In winter they lived primitively in the Rio Grande Valley—sometimes two or three families in a single-room shack. They knew virtually nothing about modern sanitation, medicine, or about the proper feeding of children. For them it was a constant, desperate struggle to keep families housed, clothed and fed.

Hoopeston, on the other hand, is a little inland city, "populated," said Mrs. Clayton Jones of the Council of Church Women, "mostly by children of people who've always lived in this particular spot. It's not a wealthy town, but it is well-to-do, and its 7,000 citizens are a comfortable, hard-working, church-going people.

What the council had to do was to cut down the differences between the two. They had to teach the migrants American ways of hygiene, sanitation and health,

improve their English and ideas of democracy. In turn the townsfolk had had to be taught to look beyond the darker skins, the difference in language, the alien ways.

"The first thing we had to do with the migrants," said R. L. Cragg, a quiet, businessman who was then secretary of the Chamber of Commerce, "was to clean 'em up so when they came to town the people wouldn't be prejudiced against them just because their clothes were dirty."

The doctors, headed by Werner Fleisser, a young man educated in Germany, gave physical exams. Nurses, aided by Mrs. Lewis Hott, an ex-Army nurse, and other Hoopeston mothers, gave the children baths and organized classes in baby care for the mothers. After awhile migrant babies began getting milk instead of coffee in their nursing bottles.

Other women gave courses in nutrition, English and hygiene. Migrant mothers learned quickly. "All you had to do," said Mrs. Jones, "was to show them a better way, say, to wash clothes than over a board and they'd grab it. They were eager to learn; the trouble was they just didn't know our ways of doing things."

"In the past two years," added Dr. Fleisser, "there hasn't been a single baby born in camp—all the women go to the hospital, though they used to have babies without even a midwife. Apparently they like it, too, because you never have a woman leave here pregnant to have her baby in Texas."

The children learned quickly, too, and before very long, said Cragg, "you began to see boys carrying combs in their pockets. Just before they got into town they'd take 'em out and give their hair a good combing."

When council members recruited volunteers they had an ulterior motive: They wanted to get as many townspeople as possible into contact with the migrants—figuring that if the local people got to know the migrants they would like and respect them. Volunteers run the nursery at the Illinois Canning Company camp, the arts and crafts classes for older boys and girls and the movies, as well as the hygiene and English classes. The men have helped out with the ball teams. Lou Ratzesberger, president of Illinois Canning, has conducted Sunday services in the camp and his daughter, Marise, helps with the girls' craft classes.

The motive began to pay off. The migrants are a gay, warm, affectionate and proud people; they promptly endeared themselves to everyone who got to know them. One reason is that they like to pay their own way. When their children's heads are inspected they pay a nickel each for the service. They pay admis-

sion to camp movies and nominal prices for the used clothing that the volunteers collect and display at Saturday afternoon "Thrift Sales."

As more townspeople came to know the migrants, the real clincher in the council campaign —word-of-mouth advertising— began to take effect. Women told neighbors about the migrants over supermarket baskets and their husbands over dinner tables. The husbands swapped stories at the mid-afternoon coffee sessions.

"My wife tells me these people keep a lot cleaner than some of our own—and it's harder for 'em, too, because they don't have any of the conveniences," said one.

Cragg, a charter member of the group, heard this sort of talk and kept it going. He had the job of siphoning contributions for the council program out of the businessmen and he did it by selling the donor-to-be on the migrants. He was helped by a slogan tossed off one night by Helen Meserve: "Learn 50 words of Spanish and increase your business 150 per cent."

"I don't think the businessmen actually learned much Spanish," he said recently, "but what that idea did was to change their whole attitude toward the Latin Americans. Instead of looking on them as a necessary evil they began to see them as customers. George Cohen, owner of a clothing store, caught on fast; he hired a Latin American girl to wait on migrant customers.

The new attitude paid off. W. C. Calvin, manager of the A & P Supermarket, says migrant business pushes his sales above sister stores that usually beat him—and does it in the summer when grocery business ordinarily slumps.

There are no accurate figures on just how much the migrants do spend in town, but an average weekly payroll amounts to about $25,000—and the canning companies estimate they spend about 75 per cent of of it in Hoopeston.

All this money doesn't go to the food and clothing stores, either.

"You should see the things they take back to Texas with them," Cragg said.

The keynote of the campaign to get Hoopeston to accept the migrants was—move slowly and don't put pressure on anybody. And while the long process of education was going on, they had to prevent any major outbreak of prejudice. Mike Fish of Stokely and Leland Bergstrom, personnel manager at Illinois, were the leaders in this phase.

One day a teen-age migrant youth with a very light skin came up to Fish with a grin. "I went to the movies last night, Mike," he said, "and instead of going to the balcony I sneaked in downstairs. Got away with it, too."

Fish's eyes narrowed. "If I'd

been there you wouldn't have," he said flatly.

The youth's grin faded. "Hell, Mike, I thought you were our friend."

"I am your friend—and that's why. I'm not interested in one or two of you guys getting away with sitting downstairs. I'm shooting for the day when any one of you people can go in and the most bigoted old maid in town can come in and sit next to you and think nothing of it. That takes time and a lot of people are working on it and I won't have any of you young punks jeopardizing it. From now on when you go to the movies, you sit in the balcony!"

Mike's theory proved out; today there is no segregation in the theater, yet nobody had protested to the manager and nobody can name the exact date when it ended. Segregation hasn't completely died out yet at the swimming pool and in Hoopeston's 30-acre McFerrin Park, but it's passing.

Leland Bergstrom is working on that angle. Each year Illinois Canning throws a big employee picnic there and at first they didn't invite the migrants, but in May, 1950, it seemed time to try it. The foremen, all Latin Americans, were skeptical—thought there might be trouble, especially when the dancing started. Bergstrom explained:

"I don't think there will be. You see what we're trying to do is to get as many townspeople as possible to know you folks. We figure that if they know you they can't be prejudiced against you. And this seems like a good chance for large numbers of them to see you in the park."

The picnic was held and there was no trouble. Only about half the migrant families came, but this year many more did. Bergstrom hopes that as a result of this it won't be long before the park will be open to them completely.

Probably the chief reason Fish and Bergstrom have succeeded in convincing the migrants that patience and self-restraint are a necessary part of living in a democracy is that they and other council members also have accorded them the privileges of democratic life. Mrs. Jones spoke for the whole council when she said:

"I have no glorified ideas about the migrants. My interest is to help prove to them that our general principles work—that they're what makes America."

Foremost among these is the self-respect a man gets when he knows that other people respect him. Bergstrom and Fish have shown their respect in different ways. Fish has been tough.

But there isn't a day that he isn't in the camp talking to the people, advising and helping

them. If they get sick, he takes them to the doctor.

But most migrants know he's their champion because they've seen the results of his battles to improve living conditions. The Rev. Ellis Marshburn, Midwest regional director for the division of home missions, says the Stokely camp is one of the finest in the country. The sanitation is excellent, showers are available, with hot water night and day and there are adequate laundry facilities.

Some migrants still live in a big, quonset-shaped warehouse with wire-enclosed cubicles for each family, but cement flooring has replaced the original dirt. A move is under way to install movable plywood partitions. Fish has had built large mess halls where each family has a stove, pantry locker, compartment in an oversize refrigerator, dining table and benches, all paid for by the Stokely Company.

The home missions staff—this year headed by David Sheldon, a young Chicago theological student, has taken the lead in teaching the migrants the self-government side of democracy. Especially good progress has been made with the youngsters.

Recently Sheldon had to leave his group of a dozen ten-year-old boys alone in the basement of the Christian Church. Before he left he put the duly elected "presidente" and the "policeman" in charge.

He walked in an hour and a half later to find the room immaculate and most of the boys sitting quietly in a semicircle of chairs facing front.

Over to one side four chairs were placed with their backs to the rest; this was the jail and in it were four small convicts.

The "presidente" explained soberly that these boys had been bad—and had papers to prove it. On an old envelope he had written, "too bad," and underneath the names—"Alberto, Pedro, etc."

The self-respect that this sort of thing has built is visible in many ways.

One of them is in the eagerness with which coveys of small Latin American boys scurry around town earning a few nickels by shining shoes.

Frank Mills, publisher of the *Hoopeston Chronicle-Herald,* in his daily column duly records incidents which help build the town's respect for the migrants. When a little migrant girl has a birthday party it appears in the personals column and last year when two Latin American couples were married in St. Anthony's Church, the story, with pictures, had the lead position on the society page.

The climax of the council's campaign for the migrants came last year at a meeting in the high school. A federal law had been passed prohibiting the employ-

ment of children during the school year and the Hoopeston Board of Education had made plans to start the migrant children in school on Monday, May 1. (The families arrive in late April.)

The Saturday night before, a spokesman for a group of parents on the west side of town called Superintendent of Schools Jared Lyon to say that plenty of people were mad over the idea and wanted a hearing. The Board scheduled a meeting for Sunday afternoon and Lyon spent the morning phoning council members, doctors, lawyers, preachers and cannery officials, telling them what was up. About 150 persons attended and all the gripes that had ever been voiced against the migrants were aired again. But the Board was ready for them.

"We answered all their questions fully," Lyon said, "and they exhausted themselves against our answers." Finally one mother said she thought the children didn't want the migrants in school.

Miss Imo Cheney, principal of Lincoln School, answered her: The children, she said, were enthusiastically looking forward to the newcomers. "Here," she added, "is an invaluable chance to teach our children the intercultural friendship that otherwise we could only talk about."

When she sat down Buzz Davis, who also lives on the west side, stood up. "I've known Miss Cheney for 20 years," he said. "If having these children in our schools is good enough for her, its good enough for me."

That ended the opposition. The next day some 50 migrant children entered school and promptly hung up a record that amazed their teachers and made most of the natives of Hoopeston proud.

The majority of Hoopestonites not only accept the migrants now, they're proud to have them and know that the Latin Americans enrich their town's life, both financially and culturally.

Hoopeston children are beginning to learn Spanish on the playgrounds; as they discover the language and customs of another culture, the narrow bounds of their provincialism shatter and they begin to understand that the world is a broad place and people are much the same everywhere. The Latin American children are benefiting, too. Formerly, said Helen Meserve, they were under such social and financial pressure that all their thoughts and efforts were concentrated on taking care of Number One. But one day a little girl, Francesca, got hurt. The next day, when they were riding in a jeep to the park, one of the girls said, "Let's all pray for Francesca."

"For the first time," said Miss Meserve, "the pressure was off enough so that they were able to think of someone else."

Using Solar Energy

Condensed from Everybodys Poultry Magazine

Gordon L. Berg

RADIANT energy from the sun is being harnessed at Pennsylvania State College in one of the most elaborate poultry houses ever constructed for experimental purposes. In fact, the huge "sun porch" appears to be setting the stage for something entirely new in poultry housing.

The 30 × 100-foot structure, with the front (facing south) made up of 25 Thermopane windows, will make it possible for birds to spend their entire lives in as much daylight as they would receive outside, minus the rain, snow and other undesirable climatic factors in raising poultry.

About two years ago, with the help of two Penn State agricultural engineers, Glenn Bressler developed a poultry utility unit which combines roosts, automatic mash feeders, constant flow waterer, and a mechanical cleaner for pushing manure out of poultry houses, thus cutting down moisture.This same unit is finding its "place in the sun" in the unique experimental brooder-laying house.

The poultry engineer is convinced that the sun can be brought under control to help lick one of the poultryman's major problems: wet litter and resulting dirty eggs.

Poultry houses in the past have been too small and have frosted over during the cold weather so that sufficient heat from the sun could not penetrate through the house to help dry the litter and keep birds warm. Usually they were not placed in proper relation to the sun's position in the winter sky, an important factor in making full use of solar heat.

Thermopane window glass is made from two lights of heavy sheet glass with a sealed pocket of dry air for insulation. Thus, solar heat is literally "trapped" inside the building. This sealed, double-glass unit is mounted in a fixed position.

"Energy from the sun, in addition to drying the litter and providing warmth for poultry, can also be used in taking surplus moisture out of the building," Bressler states. "Since warmer air will carry more moisture than cold, the added warmth eases the load on the ventilating system by reducing relative humidity

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within the building."

Naturally, the larger the area Thermopane insulating glass covers, the greater the advantages gained by the solar principle of heating. The sun's rays pass through the specially-constructed glass on a short wave length. The rays strike and warm the interior surfaces and then are re-radiated on a longer wave length which will not pass out through the Thermopane. Condensation is materially reduced, thus allowing for a maximum of sunlight to come into the building.

The Penn State experimental poultry house faces due south. In fact, the entire building was oriented by engineers to capitalize fully on the low, slanting rays of the winter sun.

South and north windows are considered most efficient; east and west windows are inefficient because they let in more sunlight than is needed in summer months and admit only a small amount of sunlight in winter months, when additional warmth is necessary.

In the Penn State building a maximum number of windows (25 large ones in front, 12 medium-sized ones in back, and one small window on each end) are utilized to determine how much glass is actually needed to heat various sized poultry houses.

The medium-sized windows on the rear wall are used primarily to study light distribution and may not be entirely necessary, according to Bressler. It has been found that the large window space on the south wall allows light rays to strike within four feet of the north wall in the winter.

No direct sunlight is needed in the summer. A 3-foot adjustable overhang running the length of the building in the front, will cut out all the sun for about a six-week period during the hottest part of the summer. The writer noted that in the house on a bright, clear day in October the temperature was eight degrees warmer on one side of the building with the overhang in the upward position than on the other end with the overhang in use. Future experimental data will reveal the exact period in which the window overhang should shut out the summer sun.

The height of the house, 10 feet in front and 8 feet in back, was determined by the elevation necessary for adequate sunlight. Bressler, however, sees no reason why present day poultry houses, properly insulated and situated satisfactorily in relation to the sun, should not be ideal for refitting with Thermopane window glass.

No experimental data is available as yet from the Penn State poultry department concerning the practical use of Thermopane in poultry houses. It is known to be in use in laying and broiler

houses in the Northeast but no information is yet available. However, data has been assembled on the effect of Thermopane on other livestock structures. In a hog farrowing house in Iowa, for example, the inside temperature never dropped below freezing with the use of large Thermopane windows, although the outside temperature dropped to 30 degrees below zero. According to Libbey-Owens-Ford Glass Company, manufacturers of Thermopane, the only artificial heat in the building was provided by heat lamps in the brooders for the little pigs.

The Penn State building is well ventilated. Eight thermostatically-controlled fans force the air into the house and keep the air changed constantly. In addition, four central fans are operated by a time-cycle repeater which makes certain a complete change of air periodically in spite of temperature.

An exhaust opening on each end of the building is equipped with a butterfly valve which opens automatically when fans are turned on.

The house is divided into two halves during the early stages of brooding. On the south side, or front half adjacent to the large windows, 3315 New Hampshire chicks were started September 25, serviced by nine conventional electric brooders. At four weeks of age the temporary wire screen was removed and the chicks allowed to have the run of the entire house. Up to this time, they were hand-fed twice daily and received water in a 2-inch angle iron trough which ran the length of the pan. A solenoid valve, controlled by a timer, allows a certain amount of water to flow every half hour. A special type faucet controls the flow to a trickle. A time clock shuts off all water flow at night.

"This type of watering system seems practical for the farm with a limited water supply," Bressler commented. "An experiment is now underway to determine how much water is required daily with the system."

The trough was moved over the automatic feeder located in the rear half of the pen when the birds were four weeks of age.

Nests are located all along the north wall. Here the "poultry utility unit" really comes into its own, with 1 by four-inch mesh wire strung over a frame to support 4-tiered roosts, automatic feeder and waterer, and a pit cleaner (consisting of paddles which push droppings forward) resting on the concrete floor of of the droppings pit. The cleaner can be operated by simply pressing a button. The paddles move the manure toward a panel on the east wall of the house, which is raised to allow a cross elevator

outside the building to convey the droppings to a manure spreader.

All major equipment and fixtures are metered separately so that the electrical load of each can be determined. There are 12 circuits in all.

Key to the solar principle of heating is good insulation in the building as well as the windows. One of the main causes of wet litter is poor insulation.

Because the foundation, walls and windows are well insulated, fans help reduce condensation easily. The foundation of the Penn State experimental poultry house goes two feet below the ground level and is made up of cinder blocks, with 3-inch zonolite insulating blocks placed to the inside of the cinder blocks. The floor is tamped earth with two inches of sand as litter.

Siding is plywood with 2-inch fibre glass insulation next to it and an aluminum foil vapor barrier. The inside wall consists of asbestos cement board. The roof is of similar construction except for a 5-inch air space between the insulation and plywood. Tar paper covers the plywood deck.

The experimental phase of the case for Thermopane is well underway. The big test will be how effectively Thermopane can help control the moisture problem, providing additional daylight and winter-time warmth for improved comfort of the birds. Control of moisture may increase the life of the building, while at the same time reducing harmful bacteria in the litter. It also contributes to labor saving by eliminating much of the dirty egg problem.

Vigorously growing, well-inoculated solid stands of legumes will fix from 75 to 200 pounds of nitrogen per acre per year.

—Meaty News

Producing Small Grain Efficiently

Condensed from Better Crops with Plant Food

W. H. Rankin
N. C. State College of Agriculture

RESEARCH and development usually precede quantity production of a new product or a better variety. When a superior article reaches the market, the less desirable and usually older competitive ones are superseded. Small grain research is developing strains of wheat, oats, and barley, with more disease resistance, and more tolerance to freezing temperatures than older strains and with a stiffer straw that resists lodging. All of these characteristics contribute to higher yields and more efficient production.

With better small grains there is a need for better cultural practices. Herein are potentialities for doubling the per-acre yields of small grains.

Experimental work has proved that yields more than double the average are easily attainable on fields and farms throughout the small-grain-producing area of North Carolina. For 15 consecutive years in field-scale production at the Piedmont Experiment Station, Statesville, N. C., the average yield of wheat has been 31 bushels per acre, barley 35 bushels, and oats 63 bushels. These may be compared to the State averages of 15 bushels of wheat, 24 bushels of barley, and 28 bushels of oats for the same period.

At this Station in 1949, a season classified as unfavorable for small grains, yields of 35 bushels of wheat per acre, 66 bushels of barley, and 80 bushels of oats were grown. These yields were produced on a soil like thousands of acres of other red uplands of the Piedmont plateau.

The principal causes of low and unprofitable yields of small-grain crops have been determined for North Carolina conditions. Means for correcting the causes and overcoming the deficiencies are available from research on 60 or more fields during the past eight years.

There are five major factors affecting small-grain yields: Seedbed preparation; quality and character of seed; seeding date; soil fertility and fertilizer practices used at seeding; and the available nitrogen supply during the period of maximum growth

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March, April, and early May. If any one of these factors is limiting, then conditions with respect to all others fail to result in high yields. Yields can be increased only if all conditions are near optimum.

TABLE I.—A COMPARISON OF GOOD AND POOR PRACTICES ON YIELDS OF WHEAT AND OATS.

	Good practices	Poor practices	Increase due to good combination
Wheat	31 bu.	12 bu.	19 bu.
Oats	63 bu.	23 bu.	40 bu.

A number of demonstrations have been conducted comparing an unfavorable combination of practices, similar to that used by many farmers, with a favorable set of conditions like that recommended by the Experiment Station and Extension Service. These demonstrations produced further proof that average yields of wheat, oats, and barley can be more than doubled. Higher yields per acre usually reflect themselves in a lowered cost per bushel.

Small grains are members of the grass family and as such respond to liberal supplies of nitrogen. On a depleted upland soil that only produced 8 bushels of wheat per acre when fertilized at seeding, a yield of 29 bushels was harvested where adequate nitrogen was supplied. Nitrogen may be obtained either through such legumes as red clover, sweet clover, and exceptionally heavy crops of lespedeza, or by purchasing it in commercial forms.

The use of more seed or more fertilizer will not overcome late seeding. Neither will seeding on time overcome the deficiency in fertilizer or a lack of nitrogen.

When seedbeds are well prepared, high-yielding superior performing varieties are used, seeding is done at the optimum time, fertilizer is used according to soil conditions and crop history, and a supply of nitrogen is provided for the plant to use during the period of maximum growth, higher and more efficient yields will be produced.

Reserve the best grade of hay for the cow during her dry period. It benefits both cow and calf.

—Meaty News

Mineral Needs of Livestock

Condensed from the Rural New Yorker

R. W. Duck

ONE of the most frequent inquiries we receive is in regard to the possible cause of weak calves, as well as breeding troubles in general. In many of these difficult cases the cows are negative to the blood test for brucellosis (Bang's disease), and both they and their calves are fed and housed well. Nevertheless there is considerable calf loss from obscure ailments which seem to defy an exact diagnosis.

On my several visits to the Missouri Station I have had opportunity to talk over the matter of soil fertility, as it may influence the health of farm animals, with Dr. William A. Albrecht, Chairman of the Department of Soils. He recently called my attention to the fact that measuring the effects of lime and fertilizers, when applied to the soil, in terms of increased crop yields only, does not give a proper evaluation of such treatments. He mentioned that if we turn to the animals which eat the forage, hay and grain produced on properly fertilized soils, we will find that, given the opportunity, the animals themselves will designate, by their taste and choice which have not as yet been fully recognized.

Illustrating this fact, was the case of Cliff Long, a hog farmer of Johnson County, Missouri. One Fall Mr. Long turned his hogs into some corn; in the far corner of this field limestone had been used on a small area several years ago, but none on the rest of the field. To Mr. Long's surprise, the hogs ate every bit of the corn from the limed area before they would touch any of the rest of the standing grain.

Another instance cited by Dr. Albrecht was on the farm of E. M. Poirot in Barton County, Missouri, where barley was seeded in the Fall to be used as early spring pasture for the cows. Part of this field received an application of 100 pounds per acre of a 32 per cent superphosphate fertilizer, while the remainder was given a 200 pound application. When the cattle were turned into this field, the areas given 200 pounds of this fertilizer were eaten first by the cattle.

On the same Poirot farm, the cattle selected a small area within a virgin pasture of 190 acres,

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where 500 pounds of limestone per acre had been drilled in as a pasture demonstration several years previous. Here the addition of such a relatively small amount as 500 pounds of ground limestone per acre produced such a lasting effect on the forage that the cattle were capable of recognizing it after a lapse of almost 11 years. This suggests the possibility that liming some of our long established, permanent pastures could make an appreciable difference in palatability, combined with possible health benefits.

It has been proven experimentally that farm animals should have constant access to a mineral mixture containing calcium and phosphorus, as well as salt and several of the trace elements. However, it has also been demonstrated that when bone ailments and calf losses are of frequent occurrence, it then becomes necessary to go back to the soil and consider its improvement in order fundamentally to correct the causative factors of these conditions.

Dr. Albrecht also called to my attention the experience of E. R. Kuck, Brookside Farms, New Knoxville, Ohio. At this well known Guernsey breeding establishment every possible precaution had been taken regarding housing and feeding of the young stock yet, in spite of these safeguards, a mortality rate as high as 40 per cent had been sustained annually for several years with their newborn calves. When it is considered that this loss was experienced with over 100 head of milking cows, it was indeed serious. In general the symptoms of the calves were that they were born weak and with little or no appetite. Severe scours soon developed with all of these calves, and about half of them developed pneumonia accompanied by much coughing. The calves that died invariably had convulsions, and no calf which entered the convulsion stage ever lived beyond six hours. Strong and very disagreeable odors were always present in their living quarters, in spite of constant cleaning. However, the calves that lived through this acute disorder manifested remarkable recuperative ability, and later matured to good sized individuals without any apparent signs of their former ailment.

Every known treatment was unsuccessfully tried on the Kuck farm to combat this calfhood ailment. The various measures taken involved the proper administration of sulfa drugs, vitamins, blood transfusions from their dams, calf scour serums and vaccines, modified milk formulas, and special prenatal feedings to the pregnant cows.

Fortunately, Mr. Kuck observed that for some reason the calves severely mutilated the walls

of their pens which had recently received a finished plaster coating. He therefore had a chemical analysis of the material made, which showed that the finished plaster coating contained considerable magnesium in the form of magnesium carbonate ($MgCO_3$) to the extent of about 45 per cent. The natural deduction was that the element magnesium was associated with this calf health problem. Consequently, some of this material was immediately ordered, four tons being ground to a fineness to go through a 200-mesh screen for mineral supplemental feeding, and 40 tons ground to go through a 100-mesh screen for pasture and field application.

Up to this time it had been the custom on this farm to feed a grain ration so supplemented as to provide a 16 per cent feed. The commercial supplement used contained minerals which were supposed to meet the usual re quirements of dairy cows in heavy milk production. Nevertheless, Mr. Kuck had always added to this ration an additional 40 pounds per ton of feed of the following mineral mixture: 40 pounds of 98.4 per cent calcium carbonate, 40 pounds of either steamed bonemeal or defluorinated dicalcium phosphate, and 20 pounds of salt. As a result of the observations mentioned, a change was made in the mineral mixture by substituting 80 pounds of dolomite lime (consisting of 54 per cent $CaCO_3$ and 45 per cent $MgCO_3$) for the 40 pounds of pure calcium carbonate formerly used.

All of the calves were then fed milk from the cows which were receiving this new mineral mixture. After about two weeks the bad odor previously present in the calf barn had practically disappeared, and the bowel movements of many of the calves were apparently normal. The calves also drank more water and soon, as if by magic, the scours of the older calves was gone. The calves just born, however, still scoured some, but they too soon recovered. A few weeks later several of the calf pen walls were covered with the same kind of finish formerly used, and none of these walls was mutilated. All calves have since been normal and healthy.

At the time that the new mineral mixture, containing the amounts of $CaCO_3$ and $MgCO_3$ mentioned, was first used, there were 16 cases of mastitis in the milking herd. Within about one month 13 of these animals were completely well, without any other treatment. Since then there has not been a single case of mastitis on this farm. Previous to feeding the mineral mixture just discussed, the incidence of mastitis in some form or other at Brookside Farms had been over 50 per cent of the herd at various times during

each lactation.

In addition, since receiving this new mineral mixture and being pastured on fields which were treated with 700 pounds of dolomite lime per acre, the cows have settled with calf much better, and have not experienced any trouble at calving time, as was often the case previously. Check cows and heifers, which did not have the advantage of the new mineral mixture, continued to produce weak calves which were subject to the same symptoms and physical conditions as before.

Striking evidence of the beneficial effect of magnesium when applied to the soil in needed amounts was apparent in the field crops grown on the dolomite-treated areas. In an abnormally wet, early season, the corn plants on untreated sections presented a patchwork of mottled colors, ranging from yellow to dark green. These discolored plants were evident on both high and low ground. On the other hand, the dolomite-treated corn fields retained a healthy uniform green, except for a few scattered low places where the plants were covered with water for several days. However, even these submerged plants, as soon as the water receded, had a remarkable recuperative ability. Later in the season the dolomite-treated fields produced corn which withstood drought much better.

On the other hand, it is important to note that any indiscriminate and improper use of a magnesium salt, or any other mineral, can result in detrimental effects to both animal and plant health. Magnesium absorption, beyond the optimum point in animals, may produce an abnormal condition known as magnesium tetany; while overuse of this element in the soil can lower the potassium intake of plants and result in corresponding deficiencies. There is an optimum balance between magnesium, calcium and phosphorus in both animal and plants which will vary from farm to farm, depending upon the amount of each which is available in the soil. It is, therefore, safer and better to consult with your local county farm bureau agent and arrange to have a soil analysis made of each field before making any shot gun application.

However, when excessive calf losses and breeding troubles are being encountered which are comparable to the conditions as herein described, it is in the interest of good dairy husbandry and farming to investigate the possibility of a mineral deficiency being a possible contributing cause, especially as it concerns the element magnesium.

Research Tackles Turkey Problems

Condensed from the Turkey World

Marion Teal and N. R. Gish
Oregon State College

DIFFERENCES are strikingly apparent in two experimental pens of turkeys at the Oregon State College turkey farm. In one, the birds are vigorous looking and all are nearly the same size. In the other, the birds range from unhealthy looking runts to some as large as the birds in the neighboring pen.

Only one condition varies between the two pens. Hereditary factors are the same, space and feed provided are alike. But a tiny bit of procaine penicillin has been added to the feed used in one of the pens. These birds are of uniform size and, at four weeks of age, weigh an average of a quarter pound more than those fed the regular ration, according to J. A. Harper, assistant poultry husbandman who is in charge of turkey research for the Oregon experiment station.

What this penicillin (2½ grams to a ton of feed) really does to bring about this result is not definitely known. However, the opinion has been expressed that the antibiotics control micro-organisms in the intestinal tract. Apparently, under ordinary conditions some individuals are stunted from the beginning because of such organisms.

In addition to faster, more even growth, there is less mortality in turkeys receiving penicillin.

This is the second year for experiments with antibiotics in turkey feeding. Last year, aureomycin and vitamin B-12 were used, with results indicating that the aureomycin helps but that the vitamin has no effect. Further experiments are being made this year with both antibiotics and vitamins. New feeding trials will be made with terramycin and bacitracin.

Antibiotics are also being used in feeding experiments with breeder hens. For this work, the birds are divided into four pens. One pen is given the regular ration, another receives vitamin B-12, another penicillin, and the fourth gets a combination of vitamin and penicillin. Later, poults will be taken from all groups and banded. Representa-

Reprinted by permission from Turkey World,
Mt. Morris, Illinois, November, 1951

tives of each will be put into different feeding experiment lots.

Less mortality and better growth because of improved feeding obviously will benefit the commercial producer. Less obvious, but equally important, are results which may come from further breeding experiments.

Harper quotes figures to prove that about 25 carloads of turkey eggs are wasted each year because of their infertility. Their value runs close to 1½ million dollars. An additional 15 per cent loss occurs in hatching. This may be due to incubator troubles, the holding condition of the eggs prior to incubation, the inheritance qualities of the hens, or other factors.

In one breeding experiment, efforts are being made to locate family differences within a breed. One hundred and twenty hens are selected from 20 dams, six daughters from each dam being used to obtain a measure of family performance. Ten hens and a tom are used in each pen. The idea is to select for further breeding from families giving the best egg production, hatchability, growth, and body conformation. Results already indicate that there are variations between families. Inheritance of fertility tests are being carried on at the college as one phase of a study for a USDA Western Regional breeding project.

Various methods of tom management are used in another project seeking to increase fertility. A pen with the normal ratio of one tom to 10 hens is maintained for comparison, and in others one tom is used for five hens in the first three weeks of laying—during the peak of mating.

With the normal ratio, fertility is about 75 per cent for the first three or four weeks, then a seasonal decline begins, ending with about 60 per cent fertility.

In the ratio of one tom to five hens, the fertility starts at 85 per cent.

Another scheme, which makes it unnecessary to have additional toms, is to stagger the time of the mating peak in the hens by placing one-fourth of them at a time in lighted quarters for five-day intervals. This stimulates some, while others are retarded in laying.

Artificial insemination is used in experiments to determine the duration of fertility in hens. Family differences show up here, too, with the sperm living longer in the oviducts of some hens than in others.

An obvious difference is noted here between chickens and turkeys, for the chicken hen has been proved to remain fertile about 10 to 20 days after insemination, while turkey hens stay fertile up to five and six weeks, and some even as long as 66 days.

Harper believes much more use of artificial insemination could be made in commercial flocks with profitable results.

Methods of brooding are also being compared through experimentation at the college. Five ways are used—hot water radiant heat, electric radiant heat, electric hovers, infra-red heat lamps, and forced hot air.

Except for the electric radiant pen, each of the methods also has a pen to show growth differences due to the amount of space allowed each bird.

The hens have one-half, three-fourths, and one square foot allowance per turkey. In pens with concrete, litter-covered floors the fastest-growing, better feathered poults are those having the most room. However, experiments show that nearly equal results can be obtained with only half as much space if the birds are on wire floors and have forced hot air.

Turkey research facilities at the Oregon experiment station are considered among the best in the nation. Approximately 400 breeding turkeys are kept each season for the experiments.

Each season 2,000 poults are reared from eight weeks to maturity on permanent pastures seeded to alta fescue, perennial ryegrass, and Highland bentgrass. Ranges are used on a two-year rotation basis.

Although, as Harper points out, turkey research is a fairly new field at Oregon State and at other state colleges, there is real hope for the commercial producer, through this research, to cut loss and add profit in the future.

Balanced Pruning of Grapes

Condensed from the American Fruit Grower

John Tomkins

Michigan State College

MANY growers of Concord-type grapes might obtain greater profits by pruning to a system called "balanced pruning." This system is based upon the fact that the capacity for fruit production varies greatly from vine to vine in the same vineyard. Maximum production may be obtained only by pruning vines according to their ability to produce.

The fruit and growth characteristics of the grape are distinctly different from many other fruits. Shortly after the buds start swell-

Reprinted by permission from American Fruit Grower, Willoughby, Ohio, December, 1951

ing in the spring a leafy shoot emerges from each bud and this shoot, before the growing season is completed, may attain a great length, sometimes 20 or more feet. Each shoot may bear three to four grape clusters or approximately one-half pound of fruit toward its base. After the shoot loses its leaves in the fall, it is called a cane.

An unpruned vine has many more buds than it can adequately supply with materials essential for good growth and yield. Thus, pruning is necessary to reduce the buds to a number the vine can readily support.

Grapes may be pruned any time after leaf fall in autumn until growth starts in the spring. Frequently, 90 to 95 per cent of the woody top is removed in the pruning operation. Thus, pruning may reduce a jumble of many canes to a select few which may be orderly arranged on the vineyard wires or trellis. The arrangement of canes on the trellis is called training. Vines in many vineyards are trained to the Four-Cane Kniffen system.

Under the Four-Cane Kniffen system, four canes are selected for fruiting and all others are removed by pruning. The canes selected for fruiting should be from the previous season's growth, have a diameter of one-fourth inch or the thickness of a lead pencil, and be well matured. Each of the four canes selected should have its origin as close to the trunk as possible, with two canes located near the top wire and two located near the bottom wire. One cane is tied to the right and another to the left of the trunk at the top and bottom wires, respectively.

Many canes under this system are pruned to 10 buds in length. Thus, many vines are pruned to 40 buds (10 buds on each of the four canes) without due consideration to the number they will support. This is a very common error regardless of the system of training used.

A vine has two competing phases of growth—fruiting and shoot or wood growth. The developing fruit has first call on the materials essential for growth. One may observe this the first year a vine is allowed to grow unpruned. It produces much fruit and very little shoot or wood growth. The weight of this growth as measured in the prunings is an index of the excess food not required by the fruit.

The number of buds which a vine should be permitted to retain is in direct proportion to the amount of wood (prunings) which it produces. This relationship was suggested by Dr. Newton Partridge of Michigan State College and recently was modified by Dr. Nelson Shaulis of Cornell.

It has been established for the

Concord grape that the following relationship exists between weight of prunings removed and number of buds the vine will adequately support:

Five pounds of prunings, 70 buds.

Four pounds of prunings, 60 buds.

Three pounds of prunings, 50 buds.

Two pounds of prunings, 40 buds.

One pound of prunings, 30 buds.

The weight of prunings refers only to the weight of the one-year-old wood removed. That is the wood which made its growth during the previous growing season.

It is possible to come very close to "balanced" pruning in an entire vineyard by weighing the prunings from only a few vines. One might proceed as follows:

1) Estimate the weight of prunings on the first vine.

2) Calculate the number of buds the vine will support according to the above scale.

3) Prune the vine so as to leave a few more than this number of buds.

4) Separate out and weigh the one-year-old wood that has been pruned off.

5) Calculate the actual number of buds the vine will support.

6) Adjust the vine if too many buds have been left.

Now, one is ready to prune the rest of the vineyard in terms of pruning weights and bud numbers and perhaps checking his estimates on several vines during the day. It certainly will be a pleasant surprise to some vineyard owners, foremen, and experienced trimmers to observe how closely they are already pruning their vines to the Concord scale. Some folks are doing an excellent job without weighing prunings. However, other folks, even with considerable experience, are over-pruning and under-pruning far too many vines by as much as 10 to 30 buds.

If a Concord vine is over-pruned by as much as 10 buds, the yield of this vine is likely to be reduced by four to five pounds. When fruit is selling at $80 a ton or four cents a pound, this means a loss of 16 to 20 cents per vine. This loss is many times the cost of the actual pruning. Far too many folks have been taking this loss for years without realizing it. Balanced pruning is a method for eliminating this loss.

Silage For Beef Cattle

Condensed from The Shorthorn World

Burch H. Schneider
The State College of Washington

A HALF CENTURY ago my father built a silo. It was the only silo for miles around. His neighbors had never heard of a silo and said that the feed would rot if he put it in there green. Today, if you climb to the top of that silo and look in all directions, every farmstead that you can see has a silo. The same is true in many other communities.

When silos were first built in the United States, they were almost invariably filled with corn or with one of the sorghums. In more recent years a number of other crops have been put into silos. Legumes were first thought to be unsuited for making silage, but now alfalfa, clover, sweetclover, green pea vines, and soybeans can, with suitable precautions, be made into good silage. Grasses, and any of the so-called "hay crops", may be put into silos. Mixtures of grasses and legumes make excellent silage, if proper care is taken. Likewise, the cereals, barley, oats and wheat, may be ensiled if they are cut at the right time. Certain products otherwise difficult to preserve, such as beet tops, sweet corn cannery refuse, and green pea vines can be made into good silage.

One of the most important considerations in making good silage is that it must not be put into the silo when it is too dry or when it is too high in water content. If the silage is too dry, it will not pack well enough to press out the air. The presence of small amounts of air will permit molds to grow. Forage, that is too high in water, may become too sour and may even spoil. We usually say that the best silage is made when it has between 30 and 40 percent dry matter.

If the forage cannot be dried sufficiently, some dry feed can sometimes be mixed with it. If a roughage becomes over-ripe, or otherwise too dry, good silage can be made by adding water while the silo is being filled.

The addition of molasses, of acids, and of certain other substances, as preservatives permits the putting up of silage in a too wet condition. However, the use of

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Aurora, Illinois, September 10, 1950

such preservatives has not become generally popular throughout the country. Those who successfully make silage year after year seem to prefer controlling the amount of water in it. A few seem to "get by" without being careful about the water content, but others find that they must observe this precaution if they are to have good silage.

What are the advantages of silage ?

Silage is palatable. Cattle like it.

It is relatively cheap.

There is less waste with silage than there is when the same crops are stored in other form. There is very little loss in harvesting silage. Cattle clean up all of it; they leave no "refused feed."

With the use of silage, you can keep more cattle on your land.

It is the cheapest and best way to preserve certain by-product feeds such as green pea vines, beet tops, or sweet corn cannery waste.

Silage can be put up in weather in which it is impossible to make hay.

Ensiling kills weed seeds.

There is less fire hazard with silage than in storing dry feed.

Ensiling preserves nutrients. The loss of total digestible nutrients, of protein, of minerals, and of vitamins is less with silage than with any other method of storing forage.

One advantage that another feed has over silage is that sun cured hay contains more Vitamin D, because of the effect of the ultraviolet rays from the sun. Also, animals crave a certain amount of dry feed. Thus, it is better to feed cattle five or more pounds of hay a head daily with silage, than it is to feed silage as the only roughage. Cattle will eat more feed and gain more weight if given both silage and hay than if fed only one of them.

How much silage can be fed to beef cattle? It is permissible to feed any amount that cattle will eat. We ordinarily expect to feed from 25 to 40 pounds of silage a head daily. With this amount of silage we can feed from 5 to 8 pounds of good hay. If part of this feed is legume, we do not need to feed any grain to winter cattle. If none of this silage or hay is legume, cattle should receive at least one pound a head daily of soybean oilmeal, linseed oilmeal, cottonseed meal or cake, or of some other protein supplement. Silage is useful in rations for fattening steers, too, as well as for wintering the cow herd.

Silage is just as economical and just as useful for beef cattle as it is for dairy cattle. We can recommend that the use of silage be greatly increased whenever forage is harvested and stored for feeding beef cattle.

Increasing Returns from Wool

Condensed from Farm and Home Science

Milton A. Madsen
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RISING costs of sheep operations require that sheep men increase their efficiency if they are to show a profit from the sheep enterprise. An effort must be made to increase the receipts per ewe. Receipts from the sheep operation are derived mainly from the sale of lambs and wool with approximately 70 per cent of the returns coming from lambs and 30 per cent from wool. Operators must strive for increased production of both lambs and wool if they expect maximum returns. Too often there is a tendency to neglect the wool production phase of the enterprise. It is possible to increase returns from wool without any marked increase of expenses. This article discusses some of the ways of increasing these returns.

The marketability of wools may be improved in two ways: (1) by improvement in the quantity, quality, and uniformity of wool produced from the individual sheep, and (2) by the proper preparation of wool during shearing and after it has been shorn.

Considerable research work has been conducted in the western states to determine methods of improving the wool productivity and quality from individual sheep. Wyoming Experiment Station workers report increasing the average fleece weight of one large herd from 8 to 11 pounds during a period of 10 years through a consistent sheep culling program. The basis for culling in this program was: (1) body weight and conformation, (2) length of wool, and (3) density of wool. Another Wyoming study indicates that an increase of about one-half pound clean wool or one pound of grease wool can be obtained by culling yearling ewes in some of the better flocks in Wyoming. Texas workers found that there is great opportunity for increasing the average weight of fleeces produced by range sheep by culling out the low producers after their first shearing. Culling programs are more effective on mixed flocks than they are on uniform flocks.

Research workers at the U. S. Western Sheep Breeding Station

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Utah State College, Logan, Utah, March, 1950

at Dubois, Idaho, found a high relationship between body weight and grease fleece weight and also body weight and scoured weight. The Dubois workers also found that with each three-eighths inch or more increase in staple length there was an increase of approximately three-quarter pounds of grease wool and one-half pound of clean scoured wool. They found that ewes free from heavy face covering or wool blindness yielded slightly heavier fleeces both unscoured and scoured. They also found that freedom from folds was correlated with greater length of staple and greater uniformity of wool throughout the fleece.

These studies demonstrate that if wool producers adopt a program of careful selection and culling based on the above named characteristics, a marked improvement in the quantity and quality of wool produced per sheep can be obtained.

Marketing agencies stress the importance of preparation of wool at shearing time. Instructions to appraisors in the schedule for the 1949 Wool Purchase Program state that all prices quoted are for wool properly prepared. Prices are discounted up to five cents per clean pound in appraising ordinary or poorly put up wool, or wool that for any reason entails excessive conversion costs. The discount for wools containing black or gray fleeces is one-third of the grease appraisal value of white wool, with a discount of ten cents per pound clean basis for a lot or any part of a lot tied with sisal binder twine. On tender or damaged grease wool the discount is twenty-five cents per pound clean basis. Stained wools are discounted from a minimum of two cents per pound clean basis for slightly stained up to a maximum of twenty-five cents for heavily stained wools. These instructions emphasize the need for using care in the proper preparation of wools if maximum prices are to be received.

Many range operators are making an effort to prepare their wool to meet these requirements. However, the widespread use of portable shearing equipment has increased the difficulty of preparing wool clips properly. The amount of dirt, heavy tags, and other foreign materials in the wool is often excessive. This may be attributed to lack of clean shearing floors and shearing pens. Even with portable shearing units a little care and preparation on the part of both the shearing crew and the operators can overcome this source of contamination.

Too often black fleeces are not separated from the white wool. Black sheep should always be sheared last and the black wool and tags sacked separately. There is room for improvement in the tying of fleeces. A poorly tied

fleece is unattractive and makes later separation of fleeces difficult.

It is recognized that many times the shearing date is beyond the control of the operator, however, where the lambing season is late, it is usually advisable to shear prior to lambing. Wool from ewes sheared prior to lambing contain less foreign matter, is more attractive, and contains fewer "breaks" in the fiber.

Each wool bag should be properly identified. A neat legible brand on the wool bag lends distinction to the wool clip whereas poorly marked, carelessly branded bags are unattractive and suggest that the contents may be prepared in the same manner. If wool is to be stored for some time prior to the date of shipping or selling it should be placed in a rather dark, cool shed to prevent undue loss of moisture and the deterioration of manufacturing quality.

Wool growers should learn as much as possible about the market grades and classifications of wool. Sometimes it is difficult to learn how an individual clip has been graded although most marketing agencies place this information on the sales account records. Some marketing agencies conduct short courses to teach the grower the different grades and proper methods of wool preparation. The grower should use these facilities whenever possible.

The shrinkage of wool is important in determining its market value. Assume that we have two clips of wool of similar quality with a clean value of $1.50 a pound. If one clip has a shrinkage of 60 per cent and the other of 65 per cent the grease values would be 60 and 52½ cents, respectively. This is a difference of 7½ cents between the two clips or a total of $750 on a 10,000 pound clip of wool. The wool grower selling at the 65 per cent shrinkage would have to produce 1428 more pounds of wool to receive the same returns. Figured in another way the operator selling at a 65 per cent shrinkage would have to average three-quarters of a pound more wool per sheep from a band of 1000 sheep to equal the returns from the clip sold at 60 per cent shrinkage.

This example indicates the necessity of learning as much as possible about the shrinkage of wool before it is sold. Considerable work has been done by state and federal agricultural agencies to assist the wool grower in obtaining information on the shrinkage of his wool. The Utah Agricultural Experiment Station found the shrinkage of range wool to be higher than similar wool from farm fed flocks. There is also a marked variation in shrinkage from wools of similar type in different areas and in different years. It has been found that longer

fiber wools tend to be lower shrinking. The length of fiber is more important in the shorter, finer wools than in the coarser grades of wool. Although there are a few guides to indicate high and low shrinking wools, it has been found advisable to obtain a shrinkage figure on each year's wool clip.

A major difficulty encountered in obtaining shrinkage information has been the development and acceptance of a reliable sampling technique. Within the past five years there has been a gradual acceptance of the core test as a means of determining wool shrinkage. All grease wool purchased through the Production Marketing Administration Wool Purchase Program must be core tested. Many wool handlers and wool manufacturers are now willing to accept this method of determining wool values. Experiment Station workers have shown that the core test properly used gives results that are close to those obtained in mill scouring operations. One of the disadvantages of the core test is that it is not adapted to the sampling of small lots of a few bags of wool. Utah studies have indicated that on small lots of wool either the use of composite samples or individual side samples will provide a fairly reliable guide to the shrinkage of these wools. The wool grower should avail himself of the opportunity to obtain a shrinkage figure on his wool clip if he is to be informed fully of the value of his wool.

Frozen Ponds Conquered

Condensed from The Organic Farmer

Dwight P. Campbell

ANYONE who has fought fire, particularly a rural fire, knows how much the first few minutes—the time it takes to chop through thick ice—can mean.

Dr. Karol J. Kucinski, research agronomist at the University of Massachusetts, has developed an inexpensive, effective remedy for frozen ponds.

He has shown that by partially filling an oak barrel with brine solution an ever-ready hole, into which a suction hose can be dropped, can be assured.

One end of the barrel is knocked out. Then when partially filled with brine, it should be floated in as deep a part of the

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pond or stream as possible, near the shore.

It is recommended that an approach to the barrel be built and the barrel anchored to it. A substantial platform can be made with a plank or two supported on posts. The barrel should be covered to keep small animals from falling in and to prevent rain water from diluting the brine solution. An upright stick nailed to the side of the barrel and extending a few feet into the air marks the exact location in case snow covers the surface.

Trials have shown that about four good blows with a fireman's axe will crumple the staves in about 16 seconds, leaving an ample hole for the suction hose.

The cost consists of about one manhour farm labor, plus scrap lumber and a used barrel and 25 to 50 cents worth of rock salt for brine.

Heifers Prefer to Choose Minerals

Dairy heifers may prefer their mineral supplements served cafeteria style—especially if type and quality of hay they receive is apt to vary.

J. W. Hibbs, dairyman at the Ohio Agricultural Experiment Station, Wooster, says heifers in two tests at the station varied the amount of mineral supplement they ate when they ate different type and quality hay.

In one test, 18 Jersey and Holstein heifers had access to steamed bone meal and salt while they were eating three different hay rations. The three hays fed were: Mature timothy; mixed timothy, alfalfa and clover; and second cutting alfalfa. A grain concentrate mixture and corn silage also were fed.

In another test, heifers had free choice of salt, sodium phosphate and oyster shell flour. They received mature timothy and mixed hay in two different periods. Hibbs says heifers consumed more calcium, sodium and phosphorus when they had free choice of salt, sodium phosphate and oyster shell flour. The dairyman says this shows it may be better to feed mineral supplements separately.

Heifers can take what they want in the amount they desire. They will not have to eat one mineral to get another.

Agricultural Extension Service
—Ohio State University

The Meat Bird of Tomorrow

Condensed from Eastern States Cooperator

G. T. Klein
University of Massachusetts

THE meat bird of tomorrow will have to make rapid growth, be feathered at a month, carry plenty of flesh on the breast and legs and have a cast iron constitution. Chances are it will have to carry white or very light colored feathers, pick absolutely clean, and be easy to dress.

It will have to make a three and a half- to four-pound average live weight at about 12 weeks and put on a pound of gain with about three pounds of feed. It will have to live and grow with no more than a square foot of floor space. If Newcastle, bronchitis or coccidiosis strikes, this chicken will have to shake it quickly and come back soon with fast growth.

Brockton Poultry Producers, Inc., recently started a trial run, paying one-cent premium for certain broilers in the three-pound weight class. This is on condition that they carry white or light colored plumage. Cellophane packing of cut-up poultry has developed a market that will pay a small premium for a bird that picks absolutely clean at 11 to 12 weeks. At present it's a white or a very light colored New Hampshire that rates the premium. Of course this bird has got to carry a reasonably wide breast and be meaty and be free of deformities.

It's very likely that this is the pattern that will be followed rather generally as the poultry industry sells more and more poultry cut-up and packaged. Transparent packages make a clean bird most important. The objection to most Reds, Barred Rocks and Barred crosses is that they carry dark pins and dark hairs on the thighs in the broiler stage. These are difficult and expensive to remove.

It is also evident that eviceration and packaging is going to call for a smaller comb than has been put on many meat strains. Dressing percentage is going to be far more important in the future.

The exception will likely continue to be the New York area where a barred bird will continue to bring the top price. This is a

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West Springfield, Massachusetts, September 1950.

live bird market where barreds have been established as the premium chicken. Even here I can see signs of it breaking down as a few dressing plants put in facilities for Kosher dressing. Some have already gone over to whites.

The great need of the poultry industry is a top broiler from stock capable of laying a fair number of eggs. The type of meat bird the industry wants hasn't much to recommend it as an egg producer. So it is expensive to produce the hatching eggs. After a short run at a fair production rate, a flock of these meat birds just about quits laying. Most producers find it next to impossible to get even a fair rate of lay. Being a large bird, feed consumption is high. It is generally an early maturing bird with exceptionally large egg size. Many double yolkers are laid and numerous "blow outs" follow.

It has been my observation that low producing stock is quickly affected by adverse weather and disease attacks. If this bird has practically ideal conditions and the best of management, reasonable production may follow. Most flock owners do not have these conditions.

A hatching egg producer needs a 35-cent premium for this type of egg and a year-round market. Yet, the broiler chick industry is highly competitive with price cutting galore. A 10-cent chick gives an argument for not being able to pay more than a quarter and sometimes it's less. There are a lot of general farmers in the hatching egg business who haven't stopped to figure just what it costs to produce these eggs. Except when eggs are scarce, the prospects for higher than 25-cent premiums are not promising.

The strains of White Rocks that are in greatest demand for broilers are somewhat better in egg production. Yet, broiler growers aren't absolutely sure that they have what it takes to grow in crowded conditions and to resist disease. There is no question about the breast width, finish and feathering. In general they look favorable.

There are some other white breeds that look promising. The White Americans developed by Ellery Metcalf, Saugus, Massachusetts, have consistently made a favorable showing in the Chicken-of-Tomorrow contests. They originated from a cross of the White Barnevelder and Rhode Island Red. They carry an especially yellow skin, reasonably early feathering, good meat type but they need more production and uniformity.

Another recent development is the cross of the Eisenbar and White American which the sponsors, Ellery Metcalf and Norman Eisenhauer, call the White Ace. It has considerable promise. If it

carries the "silver" factor it will be a good male to use on Red or New Hampshire females.

The Eisenbar is a combination of a Dark Cornish, New Hampshire and sex-linked pullet. It was developed some 12 or 15 years ago and is now a super meat type, but has a strike against it on plumage color. This is a docile bird, easy to manage—but being comparatively new, lacks uniformity. The males are often used on Hamp and Red females for the broiler cross.

This leads us directly back to the well-established fact that we badly need a dual purpose bird. If someone can come up with an acceptable cross of a medium to high producing female and a super meat type male, he ought to get 64 silver dollars. It would not only give low cost hatching eggs, but the right combination could also give hybrid vigor highly important in growth, feed utilization and disease resistance.

Perhaps the most promising breeding character that we can see today is the "dominant white" or the "silver factor" found in a few of our white heavy breeds.

The "dominant white" is the breeding factor found in White Leghorns. When mated to other breeds, the white plumage is transmitted to all chicks. There are two or three strains of White Rocks and White Wyandottes that have some of this. When a male of this breeding is mated to a Red, New Hampshire or Barred Rock, the offspring are white with some splotches of color here and there.

The "silver" factor found in some White Rocks and White Americans acts much the same way. Cockerels carrying this when mated to colored birds give offspring with the Columbian pattern. This bird is predominantly white with dark feathers on the neck, tail and wings. If silver-carrying females are mated to Red or New Hampshire males, only the male offspring are Columbians. The females are red.

The "silver" factor is utilized by many Canadians in crossing Light Sussex males on Red females to get Columbian colored offspring. When the reverse cross is made, they get Columbian males and Red Females.

Testing for the "silver" or "dominant white" factor in a male is done by mating the bird to a Red or New Hampshire female. If the chicks are White or Columbian, then the bird carries "silver" or "dominant white" as the case may be.

It is fairly easy to improve a strain for market type. It's easy to see or measure since there's nothing hidden as there is with broodiness or egg production. Considerable progress can be made in getting better meat type without trapnest or breeding pens.

Yet, some birds with equal measurements in meat quality transmit it to a greater degree than others. Family matings of a male and selected female, trapnesting and pedigree hatching of the chicks, will show these superior birds. By working with the top 15 percent of the families and using their blood freely, it is fairly easy to show progress.

In fact, improvement of any of the characters desirable in a meat bird comes most rapidly if the top 15 percent are located and used as the basis for improvement. If you have something reasonably good to start with and pick the top 15 percent generation after generation, progress is almost sure to come rather rapidly.

Fewer Farms, But Larger

While there are now about 6 per cent fewer farms than in 1900, the average acreage per farm has risen from 146 to 203 acres, an increase of 39 per cent. There has been a fairly steady increase in farm size since 1925 when mechanization became a significant factor in several regions. Along with the shift to more machinery on farms there has been a decline in the number of small tenant and share-cropper-operated farms, thus reducing the number of farms and the average size of farms. There also has been a change in the definition of a farm which tended to eliminate from the total number of reported farms, many of the small part time and rural residence type of farms.

More acreage has been brought into farms since 1935 by development of new crop and pasture land by clearing, drainage and irrigation, and additions of acreage by purchase and leasing of both private and public grazing land in the Western States and parts of the South. The improvement and fencing of pastures and the elimination of free range grazing, or grazing in common, in the South has added materially to reported farm acreages in several States. Likewise increases in leases of public land and individual allotments for grazing have added to the reported farm and ranch acreage in the Western States.

Hugh H. Wooten
—Agricultural Situation

Spuds Into Steaks

Condensed from The Farmer

THIRD year potato feeding trials at the Northwest Experiment Station, Crookston, Minnesota, have proven again that spuds—especially those culls that should never go to market—can be profitably fed to livestock.

In a recent test, 24 steers were divided into four lots of six each. Lots I, II and III were medium grade yearling steers and Lot IV choice yearling feeders.

Lot I, the check lot, got a standard fattening ration of alfalfa hay, brome hay, barley, oats and linseed meal. Lot II animals were fed all the oats straw and whole, raw potatoes they would eat, but nothing else. Lots III and IV got the same oats straw and potatoes, plus a pound of linseed meal per steer per day.

The steers went on feed Oct. 4, 1950, and off test April 18, 1951—a feeding period of 196 days.

Lot III steers did the best job, moneywise. They netted $116.39 per head over initial cost and total feed expense. Lot IV steers returned $113 each above expenses. Lot II, those getting only potatoes and straw, showed a profit of $95.29. All made more money than the test lot, which returned $75.11 net per steer.

Potatoes, figured at current feed prices on a comparative feeding value basis, were worth 60 cents a hundred when fed with oats straw alone (Lot II), 70 cents per hundred when fed with straw and linseed meal to medium grade steers (Lot III), and 73 cents with straw and linseed meal to choice grade feeders.

Steers fed potatoes made good gains—1.9 pounds per day for Lot III and 1.96 for Lot IV, as compared to 2.33 pounds per day for the alfalfa-grain check lot. The gain was in firm, well marbled flesh. Potato-fed steers had trimmer middles than Lot I animals, and commercial buyers indicated they would dress out favorably.

All steers improved their market grade during the trial. Lot I went from four commercial and two utility animals in January, to two choice and four good ones on April 18. Lot III went from six commercials to three choice, two good and only one commercial during the same period.

Conclusions reached by the University of Minnesota from the

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St. Paul, Minnesota, May 5, 1951

Crookston trials, include:

1. Potatoes need not be chopped before being fed to fattening cattle.

2. Oats straw or low quality hay is a better, more profitable roughage for use with potatoes than is good alfalfa.

3. Feeding a protein supplement with straw and potatoes increases feed utilization, produces a better finish and therefore a higher selling price.

4. While potatoes have in the past been fed, for the most part, to medium quality, high consumption capacity cattle, the 1950-51 trials indicate spuds can also be fed profitably to better grade animals.

5. Beef needs about a 200-day feeding period to become properly finished on potatoes.

Those conclusions are borne out by Red River Valley feeders. Ole Flaat, who has fed spuds almost every way possible, gets his cheapest gains from a ration of potatoes, straw and protein. Flaat has also tried ensiling and dehydrating, getting some rather startling gains of three pounds per day from dried potatoes, good alfalfa hay and limited grain. Bert Boushey, Polk County, Minnesota, put frozen spuds through a grinder last winter when his fresh supply ran out. The potatoes looked like snow flakes, but cattle liked them and did well.

Hogs, too, make money on potatoes. Eldon Hillman, Pembina County, N. D., fed out 70 on cooked spuds this past winter. Pigs farrowed Sept. 4 averaged 260 pounds by March 26 on a ration, after weaning, of potatoes and meat scraps. Hillman fed in troughs, all the potatoes hogs would clean up daily. In three years of such feeding, market buyers have never docked his potato-fattening hogs. Thorvald Moe, Polk County, has gotten similar results from feeding alfalfa with cooked potatoes. Flaat reports good gains from hogs cleaning up the small chips of raw potatoes dropped from steer feed bunks.

Even milk cows have been fed potatoes in limited amounts by Valley producers with good results.

Government researchers at the recent National Potato Conference at Grand Forks, N. D., reported work with steam-tube driers and direct fired rotary driers, such as are used for dehydrating alfalfa, to be producing dried spuds with nutritional value equal to corn on a bushel-for-bushel basis. An experiment is now in progress at Crookston on ensiling potatoes.

Newer methods may lie ahead. Discoveries, such as a digestive aid beneficial to other feeds, are possibly ahead for the potato.

Putting the Dollar Sign on Decay

Condensed from American Forests

Henry B. Steer

ENORMOUS quantities of lumber are used annually in the United States for the repair, replacement and alteration of buildings. It is estimated that more than five billion feet are required each year for these purposes on farms and an additional 1.4 billion feet for non-farm buildings.

It seems reasonable to assume that nearly half this total, or about three billion feet, is used to replace lumber that has failed because of decay.

The economic significance here is staggering. Lumber used to replace the rotted original represents about ten percent of our total sawtimber drain, or the entire sawtimber stand on 400,000 acres. If an average value of $75 a thousand feet is placed on this lumber it means that decay is responsible for an annual cost of 225 million dollars. And this does not take into account the cost of labor involved.

Wood preservatives, as the railroads and utilities have proved by use of treated cross ties, poles, and so forth, can drastically reduce this waste. Figuring that treated lumber will last five times as long as untreated—a conservative estimate—the annual cost of lumber for replacements because of decay could be reduced to 45 million dollars—a saving of 180 million dollars. The drain on the forest for this purpose could be pared to 600 million feet, and the sawtimber area cut over each year to 80,000 acres. It would make available two and a half billion feet of lumber for other purposes—enough to build 250,000 new houses every year.

A great deal of timber is also squandered every year through the use of untreated fence posts. As many as 225 million wood fence posts are produced and used in the United States in a single year. About 12 million of these posts are treated by commercial wood treating plants. If we assume that half this number are treated by small non-commercial plants we find that about 92 per cent, or 207 million are untreated.

From the cost and life expectancy data available, it can be estimated that the saving from using treated posts would average five cents per post a year. At this

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Washington, D. C., October, 1951

rate farmers in the United States would pocket a ten million annual saving if they used treated posts.

There is also an important conservation aspect to the fence post situation. The average fence post treated by commercial plants in 1948 and 1949 contained .6873 cubic feet. It is probable that these treated posts were larger than their average untreated counterpart. So if it is assumed that the average untreated post contains .5 cubic feet, the content of a post seven feet long with an average diameter of three and a half inches, then the 207 million untreated posts used each year contain about 103 million cubic feet of timber.

Another thing to consider is that the large majority of fence posts are round and are presumably cut from pole timber. (The term "pole timber" as commonly used, means timber too small for sawlogs—timber from five inches and up to sawlog size diameter breast high.) The average stand of pole timber in the United States is 1423 cubic feet an acre. This means that the entire pole timber stand on nearly 73,000 acres is cut every year for untreated fence posts.

If all fence posts were treated, the average annual consumption would be cut to about 40 million, the drain on the forest slashed to about 20 million cubic feet, and the total pole timber area cut over reduced to fewer than 15,000 acres.

It is, however, difficult to sell the use of treated fence posts to farmers who do their own work, consider cash outlays only and omit the cost of their own labor. When posts can be obtained for the cutting, hauled to the fence line, and set in place without an actual expenditure of money, it is quite a job to show that treated posts, which require a definite cash outlay, are actually cheaper in the long run.

There is also an important forest management phase to this problem. To the extent that fence posts are cut in making needed thinnings or improvement cuttings it can be considered good forest management. When, on the other hand, posts are cut from thrifty pole sized trees of desirable species in stands that are not overcrowded it is not good management. The owner of the timber is depleting his stand of fast growing trees which are entering the most productive period of their lives and are just beginning to pay large dividends in the form of annual growth.

The preservative treatment of wood when used in situations favoring decay is not an economy where it is to be in service for a short time only, for in instances of this nature durability is unimportant and the expense of any

kind of preservative treatment would be a needless waste of money.

Paint and varnish do not protect wood against decay, because they do not contain substances which are poisonous to fungi and insects. When wood of a common nondurable species is to be used in places favorable to decay, it should be impregnated with a chemical poisonous to fungi. It is generally true that a preservative treatment which will prevent or greatly retard decay will usually offer adequate protection against insect attack.

There is not now nor has there been—except in times of national emergency—a shortage of "lumber" or of other common products of the forests such as fence posts. There has been, there is now, and there will increasingly be, acute shortages of grades of lumber of high quality and of durable woods for use as fence posts, poles, piles, railroad ties, construction and other purposes where the wood is subject to decay and insect damage. It is becoming increasingly necessary to use nondurable species for the above purposes. This requires frequent replacements involving much labor and expense or the preservative treatment of these less durable woods to make them last longer.

The rate of decay depends on a number of variables. Some of these are temperature and humidity, the kind of fungus, and the character of the wood. Decay may progress so rapidly that it destroys the usefulness of a piece of wood in a few months or so slowly that it will scarcely be noticed.

There is, therefore, a tremendous variation in the life of wood of a given species for the specific purpose. An untreated pine fence post, for example, set in a well drained upland situation on a farm, may last several times as long as an identical post set in a poorly drained low lying site on the same farm. It is for this reason that universally applicable data on the life expectancy of treated or untreated wood products cannot be compiled.

However, reports from states in various sections of the country all point up the value of preservatives regardless of location.

A Wisconsin report states that untreated aspen failed within two years. Treated aspen posts were still sound after seven years. An Illinois report gives the cost of an untreated post as 60 cents and its life ten years. A treated post costs one dollar and lasts 25 years. Georgia reports that the average pine post deteriorated in from two to five years. Treated posts last from ten to 20 years. A New Jersey survey estimates the expected life of untreated posts of the common non-durable species as not over five years and that of treated posts at least 20 years.

Data from Idaho reveals that untreated lodgepole pine posts cost 30 cents apiece in place and last three years. Cost per post a year ten cents. Treated posts of the same species which cost 43.5 cents apiece were still sound after 11 years and were estimated to last for at least 15 years. With the cost per treated post a year at two and one third cents the actual saving per post a year (without charge for replacing untreated posts) would be seven and two thirds cents. Idaho farmers use five million posts a year. If all these posts were treated the annual saving would be $383,000.

Practically all poles used by telephone and telegraph, light and power and other utility companies are now given preservative treatment before use. A large part of the more than 350 million board feet of lumber and construction timbers given preservative treatment by the commercial plants in 1949 were used in the construction of bridges, trestles, crossings, loading platforms and buildings erected by railroads and utilities.

If you are a farmer or a country home owner and are about to repair or build a fence using wood posts and/or lumber, or erect a building where a part of the structure is exposed to decay, or if you are a country or urban dweller about to repair a building where some of the wood is subject to decay, take a tip from the railroads and the utilities and:

1.) Contact your state or extension forester, the nearest forestry school or agricultural college, your county agricultual agent, or private consulting forester. Several bulletins are available outlining practical methods of treating posts and other material on the farm. Cooperative treating projects have been set up in many localities, and it is possible that you can avail yourself of facilites near you.

2.) Visit or write the nearest commercial wood treating plant. (A list of plants nearest you may be had by writing to the American Wood Preservers Assn., 839 17th Street, N. W., Washington, D. C.)

3.) Remember that in the vast majority of instances, the preservative treatment of wood to be used in conditions favoring decay is economically sound and *will save you money.*

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